DOCUMENT RESUME

ED 443 611 RC 023 428

AUTHOR	Kan-Rice, Pamela, Ed.
TITLE	California's Changing Face: The Challenge Ahead. Future in Focus, 2000-2025: Population.
INSTITUTION	California Univ., Oakland. Div. of Agriculture and Natural Resources.
ISSN	ISSN-0008-0845
PUB DATE	2000-00-00
NOTE	65p.
AVAILABLE FROM	Division of Agriculture and Natural Resources, University of California, 1111 Franklin St., 6th Floor, Oakland CA 94607-5200; Tel: 510-987-0044 (annual subscription: U.S. free, foreign $18.00; single issues: $4.00 each).
PUB TYPE	Collected Works - Serials (022)
JOURNAL CIT	California Agriculture; v54 n1 Jan-Feb 2000
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Age Groups; Agriculture; Demography; Educational Needs; Elementary Secondary Education; Ethnic Groups; *Futures (of Society); Higher Education; Hispanic Americans; Immigrants; Migrant Workers; *Population Growth; Population Trends; Poverty; Rural Economics; Teacher Education
IDENTIFIERS	*California

ABSTRACT

Part of a series on California's future through 2025, this theme issue of California Agriculture examines how demographic changes and increased ethnic diversity will affect the state's agriculture, economy, and educational system. Research articles are: "Immigration, High Fertility Fuel State's Population Growth" (William A. V. Clark); "For California Farmworkers, Future Holds Little Prospect for Change" (Philip L. Martin, J. Edward Taylor); "Central Valley Evolving into Patchwork of Poverty and Prosperity" (J. Edward Taylor, Philip L. Martin); "Farmworkers Putting down Roots in Central Valley Communities" (Juan-Vicente Palerm); "Welfare Reform Shines a Light on Work-Force Development Challenges" (David Campbell); "How Will the Central Valley Economy Grow?" (Ted K. Bradshaw); "'Third' Institution Needed To Bridge Family-School Gap for Youth" (Stephen T. Russell); "ANR Responds to Hispanic Teenage Pregnancy" (Elizabeth Gong, Stephen T. Russell); "Elderly Population Will Increase Dramatically" (Bryan Lincoln); and "UC Must Take Lead in Curricula Reform, Teacher Training" (Mary V. Price, Richard A. Cardullo). Short research updates include "Women, Minority Farmers Are Growing in California," "Grandparents Become Primary Parents," and "'Tidal Wave II' To Hit Higher Education." (Contains references, photographs, and figures.) (SV)

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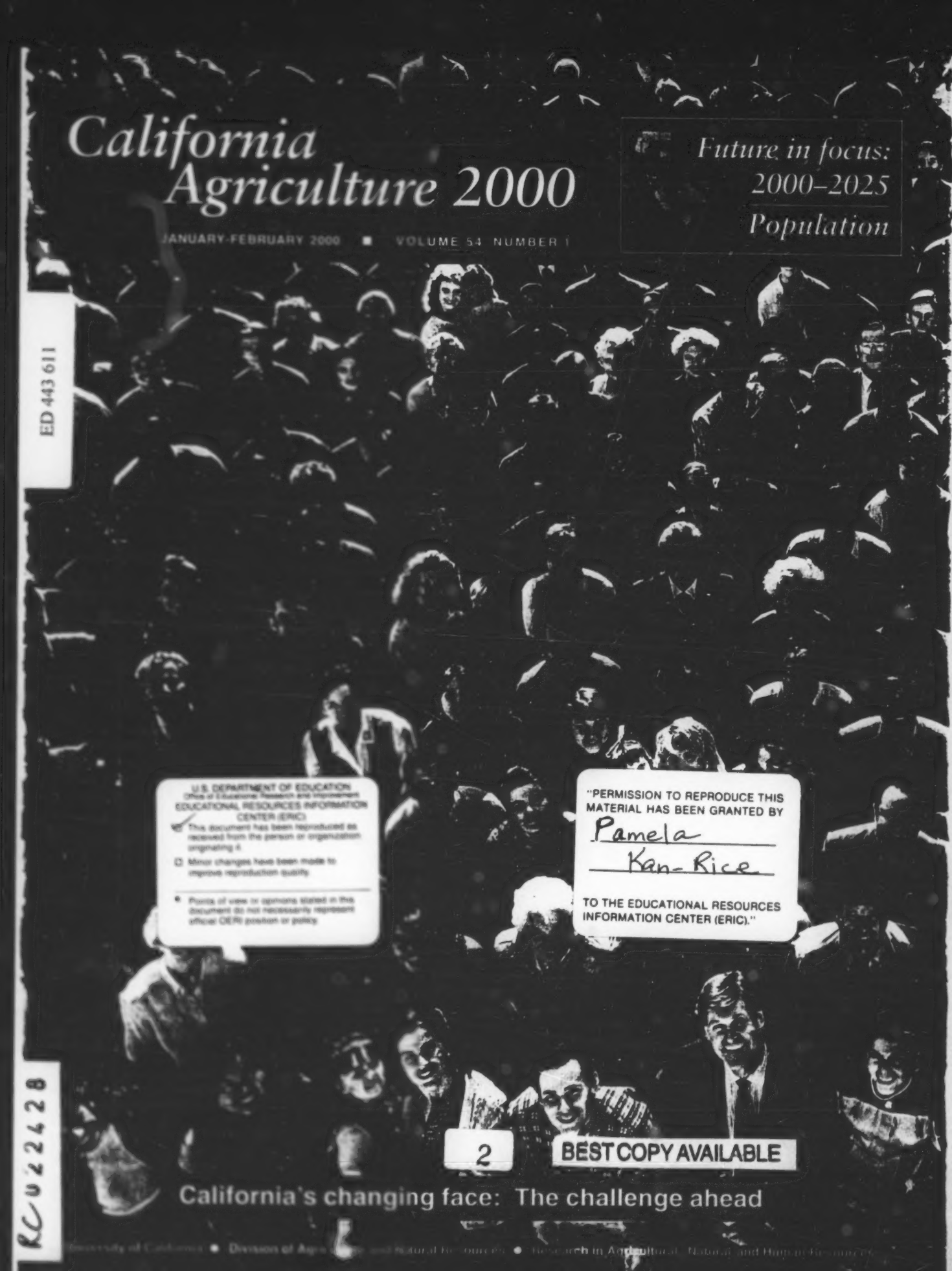
California Agriculture 2000

JANUARY-FEBRUARY 2000 ■ VOLUME 54 NUMBER 1

Future in focus: 2000–2025 Population

ED 443 611



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California's changing face: The challenge ahead

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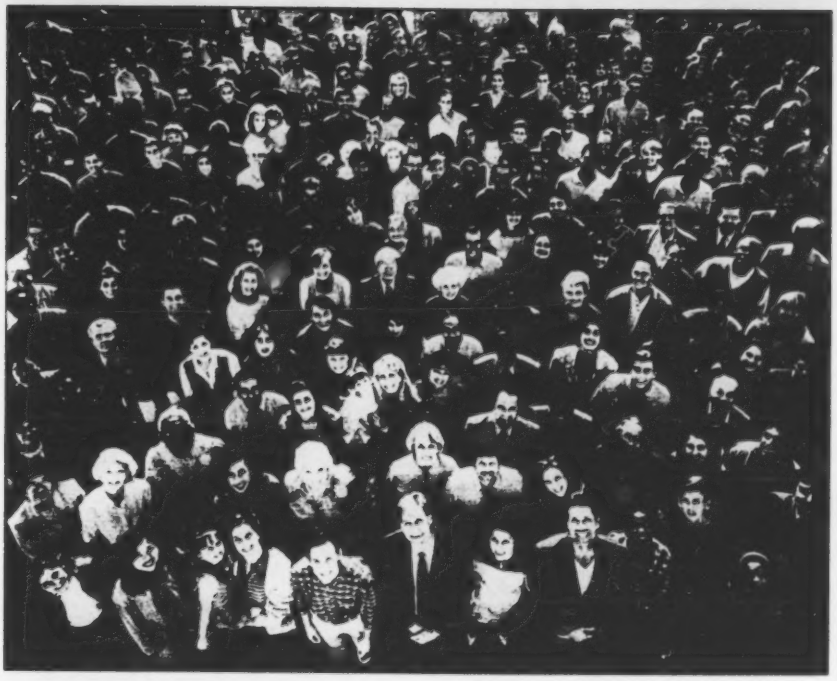

COVER: Californians are becoming more numerous, urbanized and diverse. The future will also see rising proportions of aging baby boomers and ethnic youth. *Photo by Ken Fisher/Tony Stone Images.*

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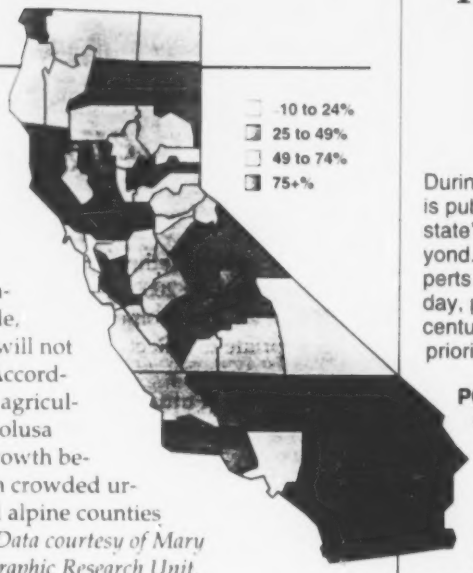
ACKNOWLEDGMENTS

California Agriculture gratefully acknowledges the contribution of Associate Editor Alvin Sokolow, who coordinated the research articles for this special issue.

The Year 2000 Project Steering Committee includes co-chairs Vice President W.R. Gomes and Associate Vice President Henry J. Vaux, Jr., UC Division of Agriculture and Natural Resources, and members: Barbara Allen-Diaz, Ecologist, UC Berkeley; George Bruening, Biochemist and Director, Center for Expression of Plant Resistance Against Pathogens, UC Davis; Michael Clegg, Plant Geneticist and Dean, College of Natural and Agricultural Science, UC Riverside; Richard Howitt, Agricultural Economist, UC Davis; Carl Keen, Chair, Nutrition, UC Davis; James Lyons, Professor Emeritus, UC Davis; Philip Martin, Agricultural Economist, UC Davis; and Bennie Osburn, Dean, UC School of Veterinary Medicine.

State predicts high growth for agricultural counties

During the next 25 years, California's population is expected to approach 50 million people, from nearly 35 million in 2000. That growth will not be distributed evenly throughout the state. According to the California Department of Finance, agricultural counties such as Imperial (123%) and Colusa (126%) will experience the highest rates of growth between 2000 and 2025, while the population in crowded urban counties such as San Francisco (-7%) and alpine counties such as Sierra (3%) will remain more stable. *Data courtesy of Mary Heim, California Department of Finance, Demographic Research Unit.*



Projected population growth for California, by county, 2000–2025

County	Population growth	County	Population growth	County	Population growth
	%		%		%
Alameda	27	Marin	11	San Luis Obispo	68
Alpine	50	Mariposa	47	San Mateo	18
Amador	17	Mendocino	39	Santa Barbara	47
Butte	62	Merced	63	Santa Clara	30
Calaveras	60	Modoc	23	Santa Cruz	53
Colusa	126	Mono	38	Shasta	45
Contra Costa	23	Monterey	58	Sierra	3
Del Norte	41	Napa	31	Siskiyou	23
El Dorado	69	Nevada	48	Solano	47
Fresno	49	Orange	27	Sonoma	41
Glenn	87	Placer	74	Stanislaus	69
Humboldt	12	Plumas	12	Sutter	52
Imperial	123	Riverside	101	Tehama	60
Inyo	17	Sacramento	46	Trinity	18
Kern	77	San Benito	73	Tulare	66
Kings	62	San Bernardino	78	Tuolumne	46
Lake	69	San Diego	43	Ventura	40
Lassen	46	San Francisco	-7	Yolo	48
Los Angeles	24	San Joaquin	68	Yuba	41
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Future in focus: 2000–2025

Population

During 2000, *California Agriculture* is publishing a special series on the state's future, through 2025 and beyond. UC scientists and other experts will analyze what we know today, project scenarios for the 21st century, and identify questions and priorities for consideration.

POPULATION (January-February) delves into how demographic changes and increased ethnic diversity will affect the state's agriculture, economy and educational system.

RESOURCES (March-April) explores how this diverse and expanding population will impact California's water and other natural resources.

AGRICULTURE (July-August) examines the role of new technologies, and the growing influence of sustainability, on one of the state's most important industries.

FOOD SECURITY (September-October) addresses problems of hunger, nutrition and food safety, in light of California's crucial role in feeding the burgeoning state, national and global populations.

What's your opinion? *California Agriculture* welcomes your comments about this series. Send letters to California Agriculture/Year 2000, 1111 Franklin St., 6th floor, Oakland, CA 94607; or calag@ucop.edu.

California Agriculture Reports of Research and Reviews from Division of Agriculture and Natural Resources, University of California *VOLUME 54, NUMBER 1*

Exec. Editor: Janet White **Managing Editor:** Pam Kan-Rice **Special Editor:** Janet Byron **Art Director:** Pam Fabry **Circulation Manager:** Lorrie Mandoriao

California Agriculture is published bimonthly by the Division of Agriculture and Natural Resources, University of California, 1111 Franklin St., 6th floor, Oakland, CA 94607-5200. **Telephone: (510) 987-0044.**

Mailed at periodicals postage rates at Oakland, CA and at additional mailing offices. Postmaster: Send change of address "Form 3579" to *California Agriculture* at the above address. (ISSN 0008-0845) SUBSCRIPTION RATES: Free upon request in U.S.; $18 yearly outside the U.S. (check or International Money Order in U.S. funds payable to UC REGENTS). MasterCard/VISA accepted; requests require signature and card expiration date. Library subscriptions are free. Single copy price $4. For a change of address, send old label or subscription number. Articles published herein may be reprinted, provided no advertisement for a commercial product is implied or imprinted. Please credit *California Agriculture*, University of California. No endorsement of products named in articles is intended.

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Population change to challenge Californians

W. R. GOMES
Vice President, Agriculture and Natural Resources

As we enter the 21st century — whether we believe that occurred in January 2000 or will occur in January 2001 — we have come to a threshold where it is appropriate to reflect and imagine.

California Agriculture launches "Future in focus: 2000–2025" knowing that we cannot, in fact, predict the future. As we write, circumstances continue to transform the world in ways we could not have foreseen 10 or 15 years ago:

- In 1989, the Internet was virtually unknown. Had we predicted its worldwide impact then, few would have known what we were talking about. Today it connects 63 million computers, each to a volume of data approaching that of the Library of Congress.
- In 1983 the world's fastest computer could perform 300 million (floating-point) operations per second and occupied a room as large as a lecture hall. Today three children equipped with desktop Nintendo machines have equivalent processing power.
- Researchers considered the obstacles to animal cloning insurmountable 15 years ago. Then in 1997, Scottish scientists shocked the world by cloning Dolly from the cultured mammary gland cell of a 16-year-old ewe — itself long dead. Since then, scientists have successfully cloned living animals from adult cells of cattle and laboratory mice, among others.

By 2050, U.S. population is projected to increase almost 50%. Even more dramatic, California growth may approach 100%. While immigration currently accounts for one-third of U.S. growth, it accounts for 74% of California growth.

Innovation and information have burgeoned in recent decades. Today, it is estimated that human knowledge doubles every 5 years. Both directly and indirectly, public and private universities have made this possible. If innovation and information are driving the future, then education and research institutions are fueling the engines.

Given that, what can UC, and specifically the Division of Agriculture and Natural Resources, add to the discussion of California's future? If we cannot predict the future, what is the purpose of the "Future in focus: 2000–2025" series?

Today there is an urgent need to expand the traditional roles of the University. In the future, UC faculty and researchers will be asked not only to research and educate, but also to equip the general public and policy-makers to navigate esoteric, often contradictory scientific information.

For the series, UC scientists and other experts have been asked to do just that. They have been charged with analyzing what we know today, projecting scenarios for 2025 and beyond and identifying key questions and issues that loom ahead. We hope that their prognostication and speculation can serve as a basis for discussion and development of new ideas. With that goal in mind, we have asked them to be both imaginative and provocative.

In this first issue, we consider population, and how future demographic changes and increased diversity might affect the state's agriculture, economy and educational system. The second (March-April) explores the effects of population and other forces on California's natural resources. The third (July-August) examines the role of high-precision techniques and biotechnology in defining the agriculture of the future. The fourth (September-October) considers food security, addressing problems of hunger, nutrition and food safety.

While our emphasis is on California, we will also view these subjects in a larger context. For example, during my lifetime, the population of California has increased 500%, that of the United States has more than doubled, and world population has increased from 2 billion to 6 billion. By 2050, U.S. population is projected to increase almost 50%. Even more dramatic, California growth may approach 100%. While immigration currently accounts for one-third of U.S. growth, it accounts for 74% of California growth. Migratory pressures including family unification and job-seeking are expected to rise.

To meet the increased food demands of billions of additional people and protect our natu-

Courtesy of Lawrence Livermore National Laboratory

◀ UC's Lawrence Livermore National Laboratory obtained its first computer, a Univac, in 1952. In 2000, the lab was poised to bring online one of the world's fastest supercomputers, with the capacity to make 10 trillion calculations per second.

Phil Schermeister

▶ Today's computers have the capacity to perform complex research functions, such as this three-dimensional brain scan at UCLA.

ral resources, we will need new ideas and new thinking. We cannot return to the "good old days," when we were asked to feed far fewer people. We cannot simply expand existing agriculture unless we find a source for the additional 1.6 billion acre-feet of water the world may need for food production by 2030. It is meaningless in a global sense to control the harvest of forests in California if we simply increase consumption of lumber from forests elsewhere.

With its burgeoning and diverse population, California is at the vanguard of emerging issues and problems. In this issue, for instance, we learn that immigration is likely to fuel continued population growth.

The implications of immigration vary widely (see p. 11). In Silicon Valley, for example, highly skilled immigrants have experienced rapid upward mobility and cultural integration. They have secured their grasp on the American dream.

In the rural towns of the Central Valley, however, immigrants have frequently found themselves living in poverty and the dream has been more elusive (see p. 26). If the eight counties of the San Joaquin Valley were a state, it would be the number-one agricultural state in the nation, but it would also be the state with the highest unemployment and would rank 49th in per capita income.

If we are to overcome these disturbing realities, there is a need for long-term work-force development and job creation linked to economic growth. Clusters of integrated, specialized industries, ranging from agriculture and food processing to biomedical supplies and information technology, promise an economic boost for the Central Valley (see p. 41).

To fully participate in the Valley's emerging industries will require the acquisition of new skills by the labor force. An opportunity exists for collaboration among public and private partners, including universities, to upgrade the local work force and cooperate in regional economic development.

In the first few years of the new millennium, based on best estimates, California will no longer have a non-Hispanic, white majority. By 2030 almost 40% of the population will be Hispanic. Asians and Hispanics together will make up more than two-thirds of the state's population, bringing new cultural issues and a changing political outlook.

As population and world consumption continue to grow, we are approaching many days of reckoning. DANR scientists and their colleagues have the expertise to help society evaluate the risks and benefits of that consumption, whether in sustaining complex ecosystems, developing genetically modified food crops, or allocating water to cities, wildlife and agriculture. We can examine alternatives, evaluate systems, and inform public policy.

With a framework of UC Cooperative Extension advisors in California's 58 counties, we are positioned to extend research to youth, families, businesses and public policy-makers. We can help our traditional clientele and develop new understanding and educational advancement for millions of new Californians.

Since they were established in the time of Abraham Lincoln, the land-grant universities have had the mandate to "bring the university to the people." More than ever before, we must use our research and extension collaboration to do so. Good science and sound public policy go together. The problem of defining a sustainable way of life in the 21st century can be solved through research, innovation and development of our greatest asset, human resources.

Q&A: Hard choices ahead for growing world

Joel E. Cohen

Joel E. Cohen is head of the Laboratory of Populations at Rockefeller University and Columbia University. Cohen earned doctorates in applied mathematics, population sciences and tropical public health from Harvard University. A world-renowned demographer and co-recipient of the Tyler Prize for Environmental Achievement in 1999, he is the author of How Many People Can the Earth Support? *(1995).*

While this special issue of California Agriculture *focuses primarily on the impacts of population growth in California, Executive Editor Janet White asked Cohen to put the state's concerns into a global perspective.*

The world's population changed dramatically in the 20th century. What can we expect in the century to come?

During the past century, the human population nearly quadrupled to 6 billion. Today more young people than ever before are entering childbearing age. Through sheer momentum, and barring catastrophe, their children will increase the world population by another 2 to 4 billion people by 2050.

Perhaps the most important demographic event in the history of the human species, however, took place around 1965, when the world's annual growth rate began to decline from its peak of 2.1%. After World War II, the industrialized countries learned how to export health without wealth. They provided cheap public health measures that dramatically lowered infant mortality in developing countries. As death rates dropped, growth rates in those countries shot up. It took from the end of World War II until 1965 for poorer countries to begin to control their fertility.

The 21st century is likely to see continued slowing, and perhaps even an end to population growth. Population is expected to reach 8 to 10 billion by mid-century.

The 20th century will be the last in human history in which most people live in rural areas. The number of urbanites rose from 200 million to 2.9 billion between 1900 and 2000; today 47% of people live in cities. The United Nations estimates that almost all population growth in the next half century will be in cities, while the rural population will remain near 3 billion people.

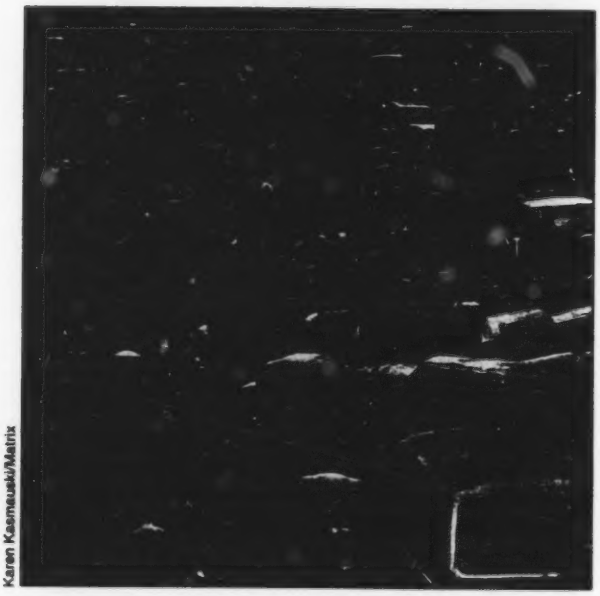
During the last century, the world's people shared very unequally in rising incomes. The average annual gross domestic product per person more than quadrupled to $5,200, as the aggregate world economy grew 16-fold. Between 1960 and 1994 the disparity in per capita income between the richest and poorest fifths of the world's nations widened from 30 to 1, to 78 to 1. If the populations of developing countries continue to grow faster than those of industrialized countries, this gap could widen further.

What problems are associated with projected population growth in developing countries and urban areas?

At present, about 80% of the world's population lives in the poor, developing world. The rest live in the rich, industrialized world. The "rich" world consists of North America, Europe, Australia, Japan and New Zealand. The "poor" world is virtually everything else. While the poor already outnumber the rich, in the coming century there will be a further, massive shift in the relative sizes of the poor and rich sectors. At current rates, in one lifetime of 75 or 80 years the poor countries will increase by 400% while the rich countries will grow by about 8%. The growth rates in the developing world will not be uniform, with the largest increases expected in certain countries of Africa, Latin America and Asia.

There are many problems that are associated with being poor and numerous. About a third of the earth's people are infected with the bacillus of tuberculosis; in Africa it's roughly half. Foodborne pathogens such as *E. coli* O157:H7 are more difficult to control, as crowded urban areas are less well-equipped with the basic means of sanitation. At present, about half the people in the world have no place to go to the toilet.

Four-fifths of the world's population live in developing countries such as Bangladesh. Nearly half of the Earth's residents now crowd into cities.



Karen Kasmauski/Matrix

What are the implications for world hunger?

Today the developing countries are importing massive amounts of food from the developed countries. Wheat and cereal yields have continued to rise steadily and the prices of major cereals have dropped dramatically. In world commodity markets the price of food is now cheaper than it has ever been.

A positive consequence is that the number of people in the world who are chronically hungry has dropped quite dramatically. In 1970, the FAO estimated that nearly a billion people were chronically hungry, more than a third of the population living in developing regions. In 1990, three-quarters of a billion people were hungry, about 20% of people living in developing regions. However, in Africa the number of chronically hungry people has grown from 100 million to 168 million.

How is it possible, if the price of food was cut in half, that more than three-quarters of a billion people are chronically hungry? The answer is that the very poor are economically invisible. They don't have cash and therefore cannot exert what economists call "effective demand" in world commodity markets. Prices are a poor indicator of scarcity, and are not a reliable measure of human well-being.

How will energy use and the environment be affected?

From 1860 to 1990, there was a 5-fold increase in the number of people on earth and a 19-fold increase in per capita energy use, due primarily to the consumption or combustion of fossil fuel. Likewise, the aggregate impact of humans on biotic and geological processes grew enormously. In the 20th century, human-induced emissions of carbon to the atmosphere grew from a half-billion tons to 7.3 billion tons per year, raising the carbon dioxide concentration in the atmosphere by about 20%. World water withdrawals from all renewable freshwater sources grew 8-fold in this century, to roughly 4,000 cubic kilometers per year. Humans now withdraw annually about a quarter to a half of all available renewable freshwater.

In the course of our demographic and economic expansion, humans have altered the habitats and populations of many other species, raising widespread concerns about extinction. For example, the area of cultivated land nearly doubled between 1900 and 1960. Since 1960, the area cultivated has not grown substantially. Rather, new lands have been converted to agriculture to replace lands abandoned or converted to nonagricultural uses, and the intensity of cultivation and the yields per cultivated hectare have increased globally.

J. Kyle Keener/Philadelphia Inquirer/Matrix

Economic factors such as interest rates can influence the progress of deforestation. Here, squatters in Brazil's Amazon rain forest clear tracts of endangered habitat.

How are cultural and economic changes expected to shape the 21st century?

It's not just population versus the environment; their interaction with culture, government and the economy must also be considered. In Brazil, for example, when interest rates are low, capital is cheap and roads can be built into new blocks of forest making it easier for peasants to deforest large areas of land. When interest rates are high, fewer roads are built and large blocks of land are nibbled at from the edges. Another factor is government regulation of the forest, and what economic activities are allowed or encouraged.

The situation of women in the economy has also changed radically in the last generation. In 1970 there were 37 working women for every 100 working men in the world, with wide variations from country to country. Twenty years later, that number has nearly doubled to 62 working women for every 100 working men. The labor force is not dependent solely on population growth but on what are culturally acceptable activities for women.

Likewise, primary education has become the norm in Western Europe, North America, and the most industrialized nations of Asia and the Pacific. However, only three-quarters of the children eligible to attend primary schools in developing countries do so today, and the 130 million children who are out of school are disproportionately girls.

At current rates, in one lifetime of 75 or 80 years the poor countries will increase by 400% while the rich countries will grow by about 8%.

Eligio Paoni/Contrasto/Matrix

Despite declines in global food prices, three-quarters of a billion people in the world are chronically hungry. International aid helps to address famine in the Sudan.

What choices do we have that can affect the course of population and the environment?

In human terms, almost nothing is inevitable about the 21st century. There are four choices about population, economics, environment and culture that can improve the human condition.

First, we can help 56% of the world's people who live in countries with continuing high fertility rates to achieve family sizes at or below replacement levels of fertility, by providing universal health and reproductive services.

Second, we can organize our economic production more efficiently. Until now, economic production has been a linear process: we extract some resource from nature, industry transforms it, consumers use it, and we throw away what's left. But today there is no longer any "away" to which we can throw things. In the future, we should strive to transform the economy into networks of industries that feed other productive activities, just as food webs in ecology link all species in a network of feeding and recycling.

Third, we can install more monitoring instruments in the atmosphere, continents and oceans, to better understand the earth's history and future and our place in it. Despite scientific advances, we still do not fully understand the functions provided by most species and ecosystems on earth.

Fourth, we can ensure that future generations are educated. Universal education would have favorable effects on fertility, economic productivity and enterprise, environmental understanding and preservation, and human capacities to innovate and to adapt. There are 1.25 billion children in the world today between 6 and 16 years old. We could probably vastly improve their education for about $500 per child per year. How can we afford not to educate all children?

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Research Updates

Women, minority farmers are growing in California

As California agriculture and population become increasingly diverse (see p. 11), women and ethnic minorities are finding new opportunities to own and operate farms.

"In the long term, it's inevitable that we'll see greater diversity" among growers, says Desmond Jolly, director of the UC Small Farm Center. "The trend is clear and irreversible."

According to the U.S. Census of Agriculture, 14% of California farm operators in 1997 were female (10,064), up from 11% of the total a decade earlier. During the same time-period, farm operators of Spanish, Hispanic or Latino origin increased 30%, from 3,471 in 1987 to 4,515 in 1997, while the number of Asian, black, American Indian and "other" owners increased 21%, from 3,663 in 1987 to 4,430 in 1997.

Steven Blank, farm finance management specialist at UC Davis and author of *The End of Agriculture in the American Portfolio*, says California's total acreage and the number of distinct farming operations slowly continue to shrink, yet the relative percentage of small farms is growing. Many new farm operators are women and immigrants, who generally start new businesses on smaller farms.

"The smaller size of farms allows easier entry in comparison with other businesses," Jolly says.

Nonwhite growers. New immigrants to California during the past two decades (such as Southeast Asian refugees) often feel at home on small farms in the Central Valley, Blank says, while long-term immigrants (such as workers from Mexico) have "acquired wealth and are now able to own farms" (see p. 33).

"Many new immigrants are not coming from an urban setting," Jolly agrees. "It's easier to adjust to rural heritage and culture." Farm operation and ownership allows Hispanic immigrants greater stability than working in the fields, although it is still a "risky and marginal enterprise," he says.

Despite the historical dominance of Europeans in California agriculture, black farmers built a number of Central Valley towns, while Sikh growers and other ethnic groups have a "long and distinguished history of agriculture in the

state," says Al Medvitz, UC Davis lecturer and Solano County grower.

Women growers. The increase in female farmers has also occurred primarily on small farms, Blank says, either with wives taking over when their husbands die or obtain off-farm jobs, or with women starting their own specialty or "niche" operations.

Specialty farming often appeals to women because "they can go anywhere in the state and grow something," says Jeri Hansen, vice president of California Women in Agriculture (CWA), a trade association with 3,500 members and 27 chapters.

Janet Pauli, operator of Pauli Ranch, oversees crews of between 25 and 80 workers on 450 acres of wine grapes and 60 acres of pears in Mendocino County. "I may get more respect [from mostly male crews] automatically because of being female," Pauli says.

Farming has also allowed Pauli to seamlessly integrate her work and family lives. "It's wonderful to work here and be with my children," says Pauli, who has two sons with husband Bill, president of the California Farm Bureau Federation. "The children are raised in it. Day care has never been a problem. Some women find it much easier to raise kids on the farm." — *Janet Byron*

Jack Kelly Clark

The trend toward more women and minority growers in California is "clear and irreversible."

Grandparents become primary parents

One of the joys of grandparenting is said to be the fun of spoiling the children then sending them home, but an increasing number of children are making their home with their grandparents. According to the 1990 U.S. Census, the percentage of all U.S. children under age 18 living in grandparent-headed households rose from 3.2% in 1970 to 3.6% in 1980 and leaped to 4.9% in 1990 and 5.5% in 1997. According to 1997 U.S. Census population surveys, 21% of these grandparents are over age 65.

In California, the 1990 U.S. Census recorded 493,080 children living in households headed by their grandparents, comprising 5.4% of children in the state age 18 and under. If the 1990 prevalence rate of 5.4% remains constant, projected over the next 25 years, there will be at least 784,000 children living with their grandparents in the state in 2025. With the proportions of both elderly and youth expected to grow in California in the 21st century, this trend is likely to continue if not rise (see pp. 11 and 55).

Alameda County health and nutrition advisor Mary Blackburn set out to determine the distribution of grandparent-headed households among California counties. Blackburn analyzed the 1990 U.S. Census data and found that in San Francisco County, 10% of children lived with grandparents, the highest rate in the state; the next highest rates were found in Imperial (8.6%), Los Angeles (7.18%) and Alameda (7.12%) counties.

"No one has ever looked at the numbers to see how many grandchildren are cared for by their grandparents," Blackburn says.

She hopes UC Cooperative Extension can use these data to develop funding for programs that address the special needs of the children and caretakers in these living arrangements.

"Many grandparents report feeling emotionally, physically and financially devastated by these added responsibilities," says Blackburn, who has worked with groups of grandparents who have assumed parenting roles.

Grandparents are often drafted as caretakers in the event of the parents' death, drug addiction, unemployment, homelessness, incarceration, abandonment, neglect, abuse or lack of child care.

Although these grandparents may be experienced parents and willing to take on the responsibility, they may not be up to the physical demands of the job. In a group of 98 grandparents Blackburn worked with in Alameda County, 81% reported chronic health problems.

Meredith Minkler, a UC Berkeley public health professor, co-authored a study that found more than 50% of custodial grandparents had trouble doing heavy housework, 41% with climbing stairs, 39% with walking more than six blocks and 17% with moving about inside the house. For these people, lifting an infant or toddler could exacerbate a physical problem.

In 1997, 5.5% of U.S. children were being raised by their grandparents.

Jack Kelly Clark

A survey of 121 grandparents at a statewide conference in 1996 showed that 60% of the children they were tending were under age 10, 15% of the total were 2 years old or younger. The grandparents reported that more than half of the children had physical and emotional problems.

"UC Cooperative Extension specialists and advisors from eight counties are seeking funding to provide grandparents at risk and their grandchildren with education and support services," Blackburn says. "Our goal is to reduce isolation and enhance their nutrition, health and well-being."

Family and consumer science advisors hope to provide grandparents with guidance in parenting, nutrition and family resource and money management.

Blackburn has national and state-by-state data, as well as California data, which have not yet been published. She intends to work with the Alameda County Planning Department again to analyze the 2000 U.S. Census data and compare them to the 1990 prevalence rates.

— Pam Kan-Rice

"Tidal Wave II" to hit higher education

UC will need to absorb 63,000 additional students during the next decade, nearly 9% of the projected 700,000 new students expected to enroll in California's public institutions of higher education.

Dubbed "Tidal Wave II" by former UC president Clark Kerr, a major increase in the college-age population will swell UC's enrollment 43% between the 1998–99 and 2010–11 school years, to 210,000 students.

This projected increase equals UC's total enrollment growth over the last 30 years, and is equivalent to the existing enrollments of UC Berkeley and UC Los Angeles combined.

"The University is committed to accommodating the students who are headed our way," UC President Richard C. Atkinson said. "We absolutely must keep our promise of access to California's students, and we will do so in ways that maximize efficiency while preserving quality."

Under the Master Plan for Higher Education, UC is obligated to enroll students from the top 12.5% of California's high-school graduating classes each year (see p. 56).

During the 1960s, UC registration also grew sharply as baby boomers enrolled during "Tidal Wave I." But the growth now facing UC is expected to last for a longer period of time, and a smaller proportion will be absorbed by the development of new campuses. The University plans to open one new campus, UC Merced, by 2005 and enroll 5,000 students there by 2010.

Announced Jan. 10, the governor's 2000–01 budget would provide UC with a 12.1%, $328 million increase in general funds, with substantial new funding proposed for the professional development of teachers, faculty and staff salary increases, new investments in research, and 6,000 new students.

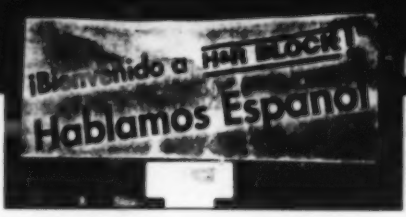
To meet enrollment demand, the University is also pursuing a range of strategies such as:

- Increasing instructional activities during the summer.
- Enrolling more students at off-campus locations; the governor's proposed budget would fund a new off-campus center in the Santa Clara Valley.
- Expanding regular enrollments during the fall, winter and spring quarters.
- Shortening students' time to graduation, which currently averages 13 quarters.

Campus growth, along with upgrades of existing facilities, will require $500 million per year in capital funding, according to UC Office of the President. The University will need to hire approximately 3,000 new faculty members and expand student services such as housing and advising.

— UC Office of the President

In less than 5 years, the transformation of this field near Merced into the newest UC campus will be well under way. Gov. Gray Davis has created a "Red Team" to expedite the process in order to begin educating students at UC Merced by 2004.



Jack Kelly Clark

Early in the new r residents will be ics and Asians wi population.

Past, present and future . . .

Immigration, high fertility

William A.V. Clark

John Stumbos

Immigration, an migrants, will c California's pop not just in the u the cities and to ties. Local com wide range of s nomic changes increasing popu As we enter a n mands for great education, healt aspects of the u ture will increas

John Stumbos

the new millennium, the majority of California ts will be ethnic "minorities." By 2030, Hispan- Asians will make up two-thirds of the state's tion.

Phil Schemeister

tility fuel state's population growth

ation, and births to new im- ts, will continue to fuel nia's population growth, t in the urban areas but in es and towns of rural coun- cal communities will face a nge of social and eco- changes as they adapt to ing population diversity. enter a new century, the de- for greater investments in ion, health care and other s of the urban infrastruc- l increase.

During the 1990s, California added almost 3 million people, including many new immigrants and a large number of new births. The flows have already transformed our large cities, and are now affecting the small towns and rural communities. In a little more than a quarter of a century, well within the lifetimes of most Californians, the state's population is projected to grow to 50 million (from 35 million in 2000), and the composition will be an even greater mix of races and ethnicities (California Department of Finance 1998; fig.1). How will these

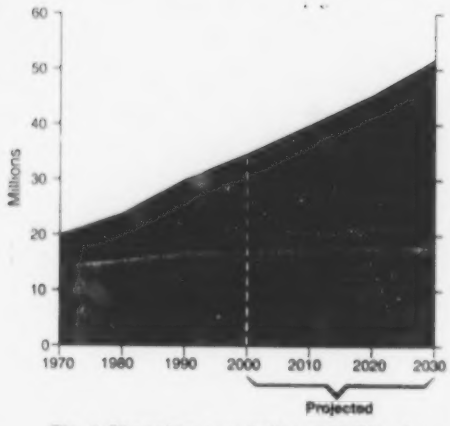


Fig. 1 Changing population of California. Source: California Department of Finance, Demographic Research Unit, 1998.

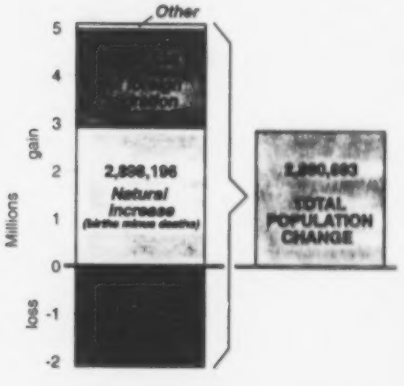


Fig. 2. Sources of population change in California, 1990–1998. Source: U.S. Census Bureau.

changes affect the state as a whole and the agricultural community in particular? What are the implications for the counties that serve as the fruit and vegetable basket of the United States?

The United States is, of course, a nation of immigrants, and California is no different. The American economy, culture and political structure have long been defined and shaped by waves of new residents from Europe, Africa, Asia and Central and South America and elsewhere. Like all previous waves, the current flow of immigrants to California will change the social and occupational structure of the state and provide new opportunities and challenges.

The growth process

Rapid population growth is not new to California. The state grew rapidly with internal immigrant waves in the 1920s and 1930s, and again after World War II, when a westward migration transformed the state into the most populous in the nation. Since the Hart Cellar Act of 1965 transformed immigration laws, California has received a large number of new migrants; the foreign-born population has grown from less than a million in 1970 to almost 8 million in 1998.

The state grew by almost 15 million people between 1970 and 2000, more than 70% (fig. 1). Between 1990 and 1998 alone, 2.88 million people were added. That growth includes a net inflow of a little more than 2 million international migrants (fig. 2), as well as 4.7 million new births. The total natural increase (births minus deaths) of 2.9 million is actually greater than the total increase in the state. However, California also experienced net domestic out-migration of over 2 million in the 1990s, resulting in total growth of approximately 2.88 million people through July 1998.

Proportionately, new immigrants provided 74% of the net growth of California's population. Much of the natural increase is due to the higher fertility rates of the new immigrant population. About half of all births in California are to foreign-born mothers (Clark 1998). The domestic outmigration from California during the 1990s was related to the downturn in the state's economy early in the decade. Changes in domestic migration are quite susceptible to economic changes and thus will rise and fall with the state's economic trajectory.

Overall, it is likely that the growth of the past 30 years will continue in the coming decades. Immigrants are still coming to California, and there is no sign that the flows will slow in the next two decades, even though increased border enforcement is making it more difficult to make the passage. Moreover, research shows that there is less circular migration than there was 40 years ago (Binational Study 1998). More people are coming and fewer are returning to Mexico and other Central American nations.

Current migration is a function of previous migration; it is a self-perpetuating process. The migrants who came earlier and stayed set up a social world for future waves of migrants, especially now that family reunification is a major part of the legal immigration process. Because migrants have increasingly dispersed throughout California, their populations will increase not only in the large urban areas, but also in the rural towns and cities. This population growth will have important implications for rural communities in the 21st century (Medvitz 1998).

State demographers now predict that California will grow to almost 52 million people by 2030 (California Department of Finance 1998). That growth is more than the current *total* population of the five-county Southern California region, and it will be very different in composition. Projections by the State Demographic Unit suggest little change in the size of the non-Hispanic, white population, but a significant growth of the Hispanic and Asian populations.

Therefore proportions of the non-Hispanic, white population will decline in relation to the entire population (fig. 1). However, as time goes by and intermarriage increases, the number of mixed-race/ethnicity families will increase. It will be more difficult to speak of Hispanic or Asian households. In addition, the new "check all" self-identification in the 2000 census will create a much more complex structure of self-reported ethnic groupings.

During the first few years of the new millennium, California will no longer have a white non-Hispanic majority, and by 2030 almost 44% of the population will be Hispanic. Asians and Hispanics together will make up more than two-thirds of the state's population, a change in ethnicity that will alter the enrollment of schools and colleges and instigate changes in political representation as these new groups participate more actively in the political process.

Jack Kelly Clark

Jack Kelly Clark

Control efforts have increased along the U.S./Mexico border, such as *top right*, where a wall faces Tijuana housing, and *above*, where border vehicles patrol a fence near San Ysidro. There are few signs that immigration to California will slow significantly in coming decades.

Aging and fertility

The coming changes can be traced to different age/sex pyramids and fertility differentials of the white, black, Asian and Hispanic populations of the state. The pyramids, which show absolute numbers in age categories for these groups, reveal striking contrasts between the white and Hispanic populations, California's two largest groups (fig. 3). The white population pyramid shows clearly the baby-boom population, now approximately 35 to 55 years old, and the baby-boom echo, between 5 and 19 years old. The graph also shows that the white population is aging rapidly, with large proportions of retirement-age men and women, especially the latter. The graph is quite unbalanced in the older-age female categories. The white population pyramid is beginning to show the classic rectangular pattern of advanced information societies, where the youthful and older populations are nearly equal.

The Hispanic age-sex pyramid is much more youthful, with the diagram more nearly a true pyramid. The large number of very young children, under 9 years of age, is nearly half again as large as the white population, and it is not difficult to envision how this very young population will translate into future increases in the Hispanic population. The average fertility of Hispanic women in California is about 3.5 children, and it is higher for Hispanic women with less than a high-school education. Relatively high fertility, large numbers of young women

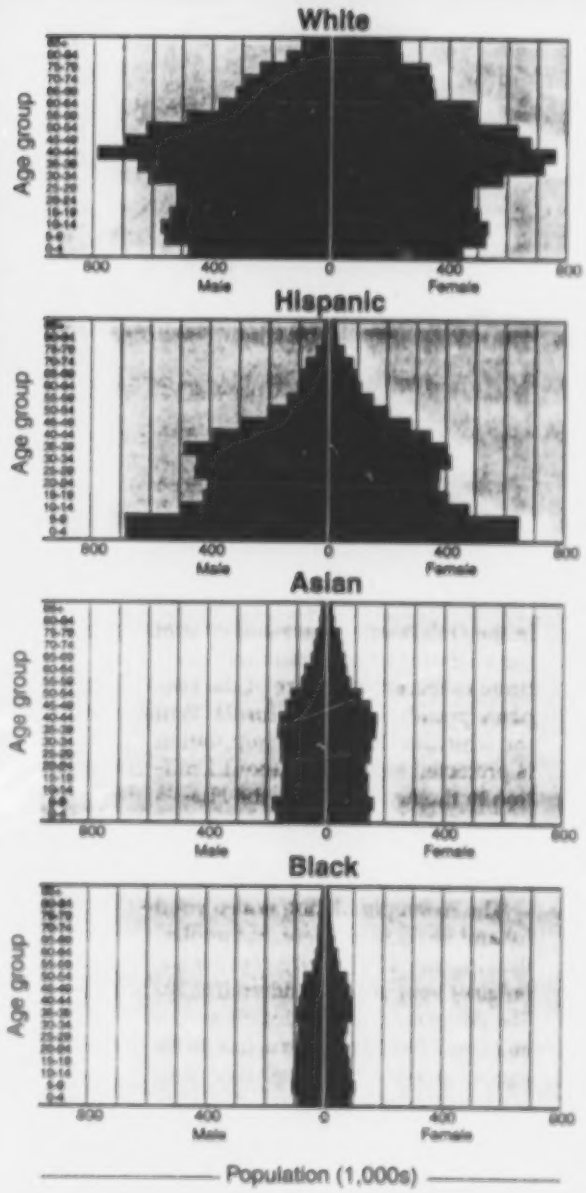


Fig. 3. Age-sex pyramids of projected populations in 2000 by ethnicity in California. Source: California Department of Finance, Demographic Research Unit, 1998.

Suzanne Pasley

John Burnett

As population grows, California develops employment centers on the edges of cities, such as in the corridor between the Bay Area and Sacramento, *left*. *Above*, in Emeryville, across the Bay from San Francisco, a vacant industrial site is being transformed into a retail and tech-industry center.

in the childbearing ages and continuing Hispanic immigration will continue to increase the size of the Hispanic population in California. While the white, non-Hispanic population is projected to grow by about 1 million in the next 30 years, the Hispanic population is projected to more than double, from 10.7 million to 22.6 million.

The Asian population is also youthful and likely to increase, but unlike the Hispanic community, there is no bulge of very young children (fig. 3). The African-American population has an almost rectangular structure to the age-sex pyramid, although there are not nearly as many African-American elderly people. The raw population numbers, plotted by age, place in perspective the declining relative proportion of the black population in California. The Asian population is currently about one and a half times the size of the black population, and by 2030 it will be more than twice as large. The population pyramids foretell the future of the state — an aging white population and a growing, youthful, ethnic population.

The geographical context

All of California is undergoing a significant transformation, but the impact is greater in some areas of the state than in others because not all counties are growing at the same rate. There is an ongoing transformation of the old patterns of clustered growth in the major urban cores of Southern California and the Bay Area. These counties will continue to grow (fig. 4), increasing by about 7.5 million people in the next 30 years. But the top 10 agricultural counties — including the Central Valley counties of Kern, Tulare, San Joaquin, Fresno and Merced — are also expected to increase by 6.6 million during the same period, almost as much as the major urban counties.

Proportionately, the agricultural counties are predicted to grow 80% in the next 30 years. That growth will be in urban centers like Fresno and Stockton, and also in the small towns. In addition, there will be a large-scale transformation of San Diego County, which is both a top agricultural producer and a major urban region.

The growth in the traditional urban areas around Los Angeles and in the Bay Area is increasingly at the edges of the metropolitan areas. These "edge cities" (Garreau 1991) have become centers of employment for an increasingly dispersed urban population. The traditional dominance of downtown urban cores, never strong in California, will be even weaker in the coming decades. This multinodal urban structure will further mingle the urban and

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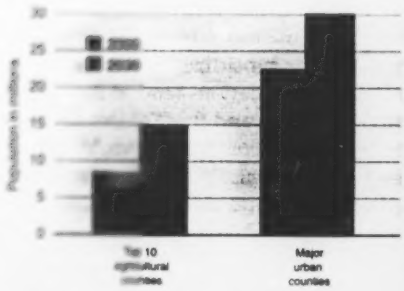

Top 10 agricultural counties	Major urban counties
Fresno	San Francisco
Tulare	Alameda
Monterey	San Mateo
Kern	Contra Costa
Merced	Santa Clara
San Joaquin	Sacramento
Stanislaus	Los Angeles
San Diego	Orange
Riverside	San Diego
Imperial	

Fig. 4. Projected population change 2000-2030 in California counties. Source: California Department of Finance, Demographic Research Unit, 1998.

John Stumbos

Oakland's Chinatown is truly Pan-Asian, with multicultural residents from China, Taiwan, Vietnam, Cambodia, Korea and other countries.

rural contexts and increase the deconcentration of the metropolitan population in California.

Much of the growth that is occurring in the Central Valley, especially in the corridor between the Bay Area and Sacramento, and in the northern San Joaquin Valley, is spillover into formerly agricultural land. Bay Area commuters and other newcomers are moving into new housing developments that are springing up in suburbs within long-distance driving of urban employment centers. A similar process is occurring in San Diego County along the corridor from San Diego to Los Angeles and in the interior valleys along Interstate 15 between Riverside, Escondido, Temecula and San Diego.

The changes in the composition of the population will affect smaller communities too — it will not be only a big-city phenomenon. Many counties and their cities will be ethnic pluralities (that is, there will not be a dominant ethnic group) by the end of the next decade. In 1990, only Los Angeles County had an ethnic plurality, but in the coming decade ethnic pluralities will cover a broad band of counties from Riverside to the suburban counties of the Bay Area (fig. 5). All of the southern San Joaquin Valley will be an ethnic plurality by 2010.

Social and cultural changes will accompany California's growth in size and ethnic diversity. For example, Hispanic immigrant neighborhoods often develop amenities such as soccer and social clubs, which in turn make them more like home for prospective migrants. This is a sign of the ability of new immigrants to create a social world for themselves and their children in their new homeland.

Equally important, the political landscape will change as candidates consider a diverse population with different needs from those of the formerly majority white population. There is a growing dynamism between immigration and social and cultural change, and the population mixing that was once more obvious in some large inner-city communities will soon be the norm for a sweep of communities across California. Even though there were always ethnic neighborhoods in the towns and cities of the Central Valley, the look and feel of neighborhoods, and the issues that have been central in multiethnic counties like Los Angeles, will become more common in the neighborhoods of Fresno, Stockton, Modesto and Visalia.

Fig. 5. Counties with an ethnic plurality in 2010. Source: California Department of Finance, Demographic Research Unit, 1998.

Suzanne Paisley

San Francisco's Mission District serves as a transitional neighborhood for many new immigrants.

Implications of population change

In the past, the primary destination for immigrants was the large cities of California. There were always migrants in the fields, but many were temporary or moved from rural areas to jobs in cities. New immigrants not only are moving directly to Central Valley towns, they are staying (Binational Study 1998). They find land and housing less expensive than in the major metropolitan regions, providing greater opportunities to achieve the American dream of becoming a homeowner.

With larger, permanent-resident immigrant populations, rural towns and cities will face issues previously thought to be the exclusive domain of metropolitan areas (Taylor et al. 1997). While the impacts of population growth and change are numerous, the general social problems of education, health care and housing can serve as important illustrative examples.

Population growth increases the needs for schools and teachers, especially those with multilingual skills. Larger numbers of people earning relatively low incomes also increase the need for subsidized health care. Youthful populations tend to have more children, and these children require doctors, community health facilities and hospitals. When populations grow rapidly and change in unpredictable ways, local communities are often caught in the position of having to provide new and expanded facilities.

Education. A relatively recent and important outcome of the changing population composition is that the schools are faced with children who have difficulty in the California educational system. Limited English proficiency (LEP) students have increased almost 50% in the past decade in California (California Department of Education 1999). While most of these students used to be in Los Angeles and Orange counties, and the majority still are, there are seven additional, more rural, counties that have proportions of LEP students greater than the California average (fig. 6).

Immigrants (and their children) who move to take temporary agricultural work usually have few skills, and their incomes are low compared with, for example, those who move to the high-tech centers of the Bay Area (McCarthy and Vernez 1997). It is therefore not surprising that rural immigrant children may be educationally disadvantaged. Although education is largely funded by the state, the local school districts must find the teachers and help acclimate these new students to the American educational system.

Teenage pregnancy. Low education levels are not unrelated to high levels of teenage pregnancy. In the past, teenage pregnancy was often associated with inner-city black populations in the large metropolitan areas. Although Los Angeles is above the statewide average for teenage pregnancies, many of those pregnancies are to new immigrant children. The pattern of counties with rates of teenage pregnancy that are above the statewide average underscores the increasingly strong impacts on rural counties and their urban areas (fig. 7). The statewide, age-specific birthrate for teenage mothers was 61.7 (the annual rate per 1,000 young women), which is well above the rate for the United States as a whole (51.1 per 1,000), and 16 counties exceeded it. Fresno, Kern, Kings, Yuba, Merced, Madera and Tulare counties had rates of more than 85 births per 1,000 young women.

There is a growing dynamism between immigration and social and cultural change, and the population mixing that was once obvious in large inner-city communities will soon be the norm for a sweep of communities across California.

Health care. Associated with teenage pregnancy, and with large numbers of births to low-income families, are issues of infant health care. The national objective for prenatal care in the first trimester of pregnancy is 90%. California as a whole is at 79.5%, and more than half of the counties in California are below this figure. Kern, San Joaquin, Tulare and Merced are all at 75%. One-quarter of the pregnancies in these counties have late or no prenatal care (California Department of Health Services 1999a).

What were often large-county issues are becoming issues in all California counties, as indicated by the fact that Kings, Madera, Merced, Monterey and Tulare counties are all experiencing high levels of Medi-Cal-funded deliveries (fig. 8). In 1997 Tulare County had 3,464 Medi-Cal-funded deliveries, costing $10.2 million, and Monterey County had 2,790 deliveries, costing $12.7 million (California Department of Health Services 1999b).

Fig. 6. Counties that have greater proportions of students with limited English proficiency than the California average in 1998-99. Source: California Department of Education, 1999.

Fig. 7. Counties that exceeded the California-wide teenage pregnancy rate in 1997. Source: California Department of Health Services, 1999a.

Fig. 8. Counties that have rates of Medi-Cal-funded deliveries 50% greater than the California average in 1997. Source: California Department of Health Services, 1999b.

Housing. Increases in population create needs for housing and other elements of shelter infrastructure, from sewers to streets. Because there is very little public housing in California, housing provision has been and still remains a private-sector activity. Given a rapidly increasing low-wage population in a state with relatively high housing costs, there are bound to be stresses in the system. Anecdotal reports document overcrowding and inadequate housing across a wide range of contexts, but nowhere more dramatically than in the agricultural regions of California's Central Valley. Migrant workers, who follow the harvests, are often crowded 10 to a room in cheap motels. The federal Commission on Agricultural Workers estimates that nearly a third of California's farmworkers lack adequate shelter (New York Times, May 31, 1998)

The Statewide Housing Plan Update estimated that California had an annual need for more than 200,000 units during the 1990s, but produced only a little over 100,000 units annually (California Housing Resource Center 1998). The greatest shortfall has been in the production of multifamily housing. The gap between housing demand and housing production has created greater housing cost burdens, especially in the major metropolitan areas, where rents increased by 20% to 35% between 1995 and 1997.

Nearly half of all renter households in California paid more than 30% of their income for housing; among poor renters, 63% paid more than 50% of their income for housing (California Housing Resource Center 1998).

Along with problems of affordability, there are increasing problems of overcrowding, especially for low-income Hispanic households, which account for more than three-quarters of all severely crowded households. Overcrowded units often have problems and require rehabilitation. Statewide, about 12% of the housing stock is substandard, but that figure rises to between 20% and 25% for much of the Central Valley housing stock.

Future in focus: Policy debates

The changes occurring in California are connected to worldwide changes in immigration and globalization (Clark 1998), which are similar to those in a wide variety of other countries and states. The changes occurring now, and those expected in the next three decades, are related to continuing high levels of legal and illegal immigration, to the demand for low-wage labor by industrial and agricultural entrepreneurs in California, and to the lack of a consensus on a population policy for the United States as a whole. The outcomes are altering local social and economic contexts and are imposing considerable burdens on some local governments (Clark 1998).

There is no evidence, given current legal admissions of almost 1 million people per year to the United States, that the California population will slow its growth even after 2030. Although it is expected that the current high fertility of the new Hispanic population will decrease, even modest fertility levels will continue to increase the Hispanic population. In addition, Mexico will grow to about 150 million by the middle of the next century, putting pressure on job provision within Mexico and motivating young workers to look for work in the United States. Given current conditions in Mexico, it is not at all clear that Mexico will have sufficient job growth for its expanding population. We can expect continuing flows whether there are jobs in California or not.

The population growth in traditionally rural counties has increased pres-

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Suzanne Paisley

Low-income and publicly funded housing are hard to come by in California, while private-sector builders cater to middle- and upper-income buyers. One-third of the state's farmworkers lack adequate shelter.

sure to control "sprawl" and limit farmland conversion to urban uses (Sokolow 1998). Californians are struggling to balance the growing demand for housing with the need to protect natural resources and agriculture. In the absence of regional or statewide land-use policy, land-use decisions are fragmented, as illustrated by growth-control proposals in some communities coexisting with virtually unregulated growth in others. Finding a balance between demands for housing and protecting California's agricultural and natural resources will take place amid expanding concern over local growth-control proposals. The recent decision of the Packard Foundation to fund farmland purchases is a sign of the renewed focus on urban growth and urban encroachment (*Los Angeles Times*, Oct. 24, 1999). As already demonstrated, nowhere is this more apparent than in the Central Valley.

The flows of undocumented migrants will not decrease either. Current estimates from the U.S. Immigration and Naturalization Service's Office of Policy and Planning suggest undocumented flows of about 275,000 per year to the United States. About half are from Mexico, and the majority enter through California even if they do not stay in the state. Some sense of the pent-up demand for entry to the United States is contained in the waiting lists for visas. In 1997 there were more than a million Mexican nationals waiting for visas to the United States (Clark 1998). Moreover, where once the flow of undocumented immigrants was largely male and youthful, the flow now includes many more families and women.

California in the next two to four decades will undergo changes that are not dissimilar to earlier periods of rapid growth in California history. The issue is how to incorporate and empower these new Californians. Although many new immigrants bring needs for additional resources, they are also a large proportion of the California labor force, and they provide much of the low-wage labor for the low-cost services that Californians enjoy on a daily basis. In addition, ethnic diversity continues to enrich the state, both culturally and socially. At the same time, the state would be amiss if it did not recognize that a significant proportion of the new immigration population is struggling with low incomes and limited opportunities.

The question for California now is how to invest in education and social services to ensure that the new flows into the state enrich California just as earlier waves set the stage for today's social and economic advances.

W.A.V. Clark is Professor of Geography, UC Los Angeles and author of The California Cauldron: Immigration and the Fortunes of Local Communities.

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19

Despite advances in technology, agriculture remains labor-intensive. Thousands of workers are still required for tasks such as picking and pruning.

Phil Schoremeister

For California farmworkers, future holds little prospect for change

Philip L. Martin ❑ J. Edward Taylor

Agriculture is a major employer in California. Some 800,000 to 900,000 people work for wages at some time during a typical year on California farms. Only about half of those work year-round so that farmworkers represent just 3% of California's average 14 million wage and salary workers. Most farmworkers in California are seasonally employed on one farm for less than 6 months each year, and earn a quarter of the average factory worker's annual salary. The vast majority are Hispanic immigrants. During the next quarter century, these trends are likely to continue, with the farm labor market becoming increasingly isolated from the mainstream. An alternative scenario is that strong unions and government regulations could transform farm work into an occupation that can provide a career and support a family. Immigration policy will play a critical role in determining the characteristics of California farmworkers in the 21st century.

Most major farm labor debates at the dawn of the 21st century involve arguments about the proper role of government in the farm labor market. How should trade and research policies influence farmer decisions on what crops to grow and how to harvest them? How easy should it be for farmers to employ foreigners as guest workers? What labor and immigration laws should apply to the farm labor market, and how active should governments be in enforcing these laws?

Current debates about the farm labor market can be framed by two extremes. One scenario imagines that hired farmworkers will increasingly be recently arrived immigrants, so that the farm labor market will be further isolated from other U.S. labor markets. Under this scenario, the seasonal workers of 2020 are being born today in Mexico and Central America. The other extreme imagines unions or government regulation making farm work an occupation that can provide a career and support a family. The actions of farmers, workers and government will determine where the reality is likely to fall between these extremes.

This paper surveys the farm labor market at the beginning of the 21st century and outlines its likely evolution. The number and characteristics of farmworkers played a major role in shaping 20th-century agriculture and the farm labor market, and the farm labor supply is likely to continue to do so in the 21st century. At the beginning of the 20th century, farmers worried about whether Chinese and Japanese farmworkers would continue to be available; at the end of the 20th century, farmers worry about the future availability of Mexican farmworkers.

During a typical year, the 35,000 farm employers in California, including crop growers, livestock farmers, custom harvesters and farm labor contractors (FLCs), hire 800,000 to 900,000 individuals. Most farm employers are native-born, non-Hispanic whites, while most farmworkers are Hispanic immigrants.

Farmworkers' average hourly earnings are about half of average manufacturing wages, $6 to $8 versus $12 to $14 per hour. The average hourly earnings reported by the U.S. Department of Agriculture in *Farm Labor* pub-

lication include the earnings of supervisors, which raises average hourly earning figures (USDA 1999). In 1999, for example, average hourly earnings for all hired workers in California were $7.88. However, average hourly earnings for field workers were lower: $7.18. Farmworkers average about 1,000 hours of work per year, about half as many as manufacturing workers. As a result, farmworkers in California have annual earnings that are one-fourth of the $24,000 to $28,000 average of factory workers.

Jack Kelly Clark

California farming is often compared to manufacturing, with open-air enterprises converting raw materials into finished products.

Farm labor market characteristics

Four characteristics distinguish the farm labor market in California:

- The farm labor market is dominated by specialized enterprises with highly seasonal labor demands — peak employment can be 20 to 30 times greater than trough employment.
- Since 1960, labor-saving technologies have not reduced the overall demand for low-skill farmworkers. Instead, increased production of labor-intensive crops and the shift of some nonfarm packing work to the fields (for example, field packing) increased the average monthly employment of farmworkers in the 1990s.
- Most farmworkers are immigrants, and virtually all new entrants to the farm work force were born abroad. U.S.-born workers have almost entirely disappeared from the farm labor market.
- Farmworker earnings are among the lowest of any segment of the U.S. work force, reflecting relatively low wages and less than full-time employment. Relatively few farmworkers receive fringe benefits such as health insurance so the farm-nonfarm gap in total compensation (earnings plus fringe benefits) widened in the 1980s and 1990s.

Farming in California is often compared to manufacturing. Most farmworkers in California are employed in open-air enterprises that turn raw materials into finished products. A "farm factory" brings together people, land, water and machines to transform seeds into crops. Because the agricultural production process is biological, farm factories face risks that do not arise in manufacturing production processes governed by engineering relationships.

California agriculture is dominated by specialized enterprises that often hire hundreds of workers for a 3-week harvest. Unlike the typical Midwestern family farmer, who does most of his own farm's work, the managers responsible for California's labor-intensive crops rarely hand-harvest themselves. A familiar adage captures many of the differences between California agriculture and Midwestern family farms: California agriculture is a business, not a way of life.

California fruits and vegetables do not ripen uniformly, so the peak demand for labor shifts around the state in a manner that mirrors harvest activities (see box, p. 22). Harvest activity occurs year-round, beginning with the winter vegetable harvest in Southern California and the winter citrus harvest in the San Joaquin Valley and ending with late olive and kiwi harvests in October.

In late fall and early winter, some workers migrate to Southern California and Arizona for the winter vegetable harvest, and others return to Mexico, but most remain in the areas where they did farm work, jobless and waiting for a new season to start.

Workers willing to follow the ripening crops can find 8 to 10 months of harvest work each year. However, relatively few workers follow the ripening crops in California. A 1965 survey found that 30% of the workers migrated from one of California's farming regions to another (California Assembly 1969), and a 1981 survey of Tulare County farmworkers found that only 20% had to establish a temporary residence away from their usual home because a farm job took them beyond commuting distance (Mines and Kearney 1982). The National Agricultural Workers Survey, conducted annually, reported that 20% to 40% of California crop workers interviewed would be willing to or had traveled beyond daily commuting distance from their homes to do farm work (USDOL 1998, Gabbard et al. 1994).

The number of farm jobs in California has been remarkably stable since the 1960s, and it rose in the 1990s (fig. 1). The loss of jobs due to picking a crop by machine rather than by hand in many commodities has been offset by the growth of jobs in other farm commodities and the substitution of hired workers for family workers on many farms. During the 1960s, when the processing-tomato harvest was mechanized, it was widely expected that most crops grown in California would be harvested mechanically by 1975. This did not happen, largely because workers were generally available and because of the costs involved in adapting plants and machines for hand-harvesting some perishable commodities.

Labor in the 1990s

Most California farmworkers are Hispanic immigrants. The National

Agricultural Workers Survey interviewed 1,885 crop workers employed in nine California counties between 1995 and 1997, and found that 95% were foreign-born, including 91% who were born in Mexico (fig. 2). About 53% of those interviewed had been in the United States for less than 5 years, and 26% for less than 2 years. About 48% were legal immigrants and 42% were unauthorized (USDOL 1998).

Most farmworkers are young men with families. In 1995 through 1997, about 82% of California crop workers were men. The median age of farmworkers was 30, 31% were under 24, and 63% were under 34. About 61% of crop workers were married, and most married workers had families, with an average of three children each. About 60% of farmworkers in the mid-1990s had their families living with them while they did farm work in California; 40% left their families outside the United States. Two-thirds of the workers interviewed had less than 8 years of education, which they usually acquired abroad. Their median years of schooling is 6 (USDOL 1998).

California farmworkers averaged 23 weeks of farm work a year in the mid-1990s, 3 weeks of nonfarm work, and 26 weeks without farm work. In most cases, time not working is spent outside the United States. Most of the workers interviewed (91%) were employed in fruits and vegetables. Of the jobs performed by sample workers in the previous 12 months, about 70% were pruning, irrigating and other nonharvest operations, and 31% were harvesting. Hours of work averaged 42 a week, and average hourly earnings were $5.69. Most interviewed workers had low incomes; 55% earned less than $7,500 in 1996 (USDOL 1998).

A century of farm work

These characteristics of farmworkers are not new. Farmworkers have generally been newcomers to the state with few nonfarm job options because they lacked the language, skills and contacts to move out of the farm labor market. California farm-labor history is the story of waves of newcomers entering the state to do farm work, and then returning to their country of origin or moving into nonfarm jobs. Farmworker's children who are educated in California generally refuse to follow their parents into the fields, so that most entry farmworkers have been raised outside the state (Martin 1996).

The state's growers have had a keen interest in U.S. immigration policy since labor-intensive fruit and vegetable farming developed in the 1880s. Farmers feared that they would have to slow the planting of trees and vines in the 1880s, after the federal government ended Chinese immigration in 1883. However, labor became available from Japan, and plantings of labor-intensive crops tripled in the 1890s. Worries about unskilled immigrants in cities led the United States in 1917 to exclude immigrants over 16 who could not read in any language. California farmers asked the U.S. government to exempt Mexicans coming to work on farms and railroads, and Mexicans soon dominated the farm work force in many areas.

Mexicans stopped migrating to the United States to do farm work in the 1930s, and many already in California were forced to return to Mexico during the Depression. After 1935, small farmers from the Midwest and South began arriving in California, hoping to begin as hired-hand farmworkers and work their way up the agricultural job ladder to become farmers in their own right. Most did not, and the conditions under which some lived inspired an outpouring of farm-labor literature, including John Steinbeck's *The Grapes of Wrath* in 1940.

By 1942, many farmworkers were drawn into the armed forces and industry, and growers fearing labor shortages persuaded the U.S. and Mexican governments to sign the first of what would become 22 years of *bracero* agreements that permitted Mexicans to enter the United States to work on farms. As rising incomes and

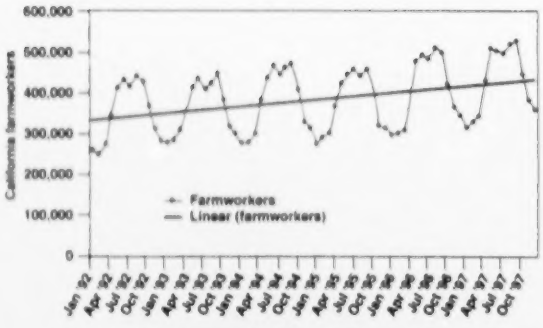
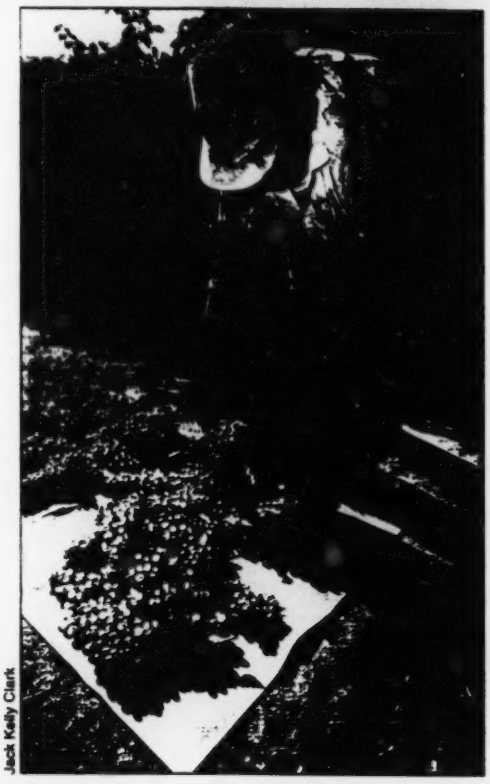


Fig. 1. Numbers of California farmworkers, 1992–1997. Source: Employment Development Department.

Fig. 2. Characteristics of California farmworkers, 1992–1997. Source: National Agricultural Workers Survey.

population growth increased the demand for fruits and vegetables, and transportation improvements enabled California growers to produce commodities that could travel to the East Coast, the availability of *bracero* workers facilitated the expansion of agriculture. When the *bracero* program ended in 1964, many growers feared that lack of labor would force them to mechanize or stop growing labor-intensive crops.

UC received special funding to accelerate labor-saving research by redesigning plants and machines, as with processing tomatoes. Meanwhile, the absence of *bracero* workers enabled Cesar Chavez and the United Farm Workers (UFW) union to obtain a 40%, 1-year wage increases from some grape growers in 1966. There were predictions that the day of the unskilled farmworker was fast coming to a close, prompting the federal government to launch a series of programs that helped farmworkers, especially migrants and their children, to "escape" from farm work (Martin 1998).



Jack Kelly Clark

Up to 50,000 workers are hired in late summer and early fall to harvest 300,000 acres of California raisin grapes.

A year in the fields

Farm work changes throughout the year in California. Seasonal work includes the following activities:

January/February. Branches and vines are pruned to promote the growth of larger fruit. For peaches, pruning accounts for 10% to 20% of the seasonal labor, but because it occurs over several months, fewer workers are involved than in harvesting. During the winter months, employment on farms is only half of its peak September levels.

March/April. Harvesting moves northward into the coastal plains, with workers harvesting lemons and oranges in Southern California, working flower and nursery crops, and thinning and weeding vegetable crops in the Salinas area.

May. Picking of strawberries and vegetables begins on the coastal plains, and continues throughout the summer.

June. A statewide minipeak in the demand for labor occurs in June. Tree fruits such as apricots, peaches, plums and nectarines must be thinned in the San Joaquin Valley, with workers removing some fruit buds to provide larger harvested fruit. Some tree fruits, such as cherries, are ready to be harvested in late spring, as are table grapes and vegetables in the Coachella Valley and Southern California produce.

July/August. During the summer months, vegetables continue to be harvested in the coastal valleys. In the Central Valley, up to 150,000 farmworkers harvest tree fruits as well as cantaloupes, melons, tomatoes and Valencia oranges. Thousands of farmworkers are also hired to irrigate crops and to weed field crops such as cotton.

September. Farmworker employment reaches its peak with a series of short and labor-intensive harvests, including the 40,000 to 50,000 workers needed to harvest 300,000 acres of raisin grapes. Peach and melon employers worry about whether "their workers" will remain to finish the harvest, while raisin growers worry that too few workers will show up before rain threatens to ruin the drying grapes.

October. Only a few late harvests remain, including olives and kiwi fruit. Most of the food processing and packing workers are laid off, and these nonfarm operations shut down for the year.

November/December. Some harvesting of winter vegetables takes place in Southern California and Arizona, but most workers are idle or return to Mexico.

– P.L.M. and J.E.T.

Farm wages/prices index

Predictions of a mechanized agriculture proved premature. Americans increased their consumption of fruits and vegetables in the 1970s and 1980s, and Mexican workers continued to enter the state to do farm work legally and illegally. By the early 1980s, when the United States discussed imposing sanctions or fines on employers who knowingly hired unauthorized workers, farmers feared that immigration reforms would lead to labor shortages. The Immigration Reform and Control Act (IRCA) of 1986, which was intended to give agriculture a legal labor force and set in motion gradual wage increases, instead led to a new wave of authorized and unauthorized immigrant farmworkers (Martin et al. 1995).

IRCA created two legalization programs: a general program that granted legal status to 1.7 million illegal aliens who had resided continuously in the United States since Jan. 1, 1982, and the Special Agricultural Worker or SAW program, which granted legal status to 1.1 million illegal aliens who did at least 90 days of farm work in 1985-86; half of the SAWs legalized were in California. In addition, IRCA gave farmers two guest-worker programs under which they could obtain legal farmworkers if there were farm labor shortages.

According to the federal Commission on Agricultural Workers, appointed by the president and Congress to review the effects of immigration reforms on U.S. agriculture, the SAW program legalized about a million young Mexican men, equivalent to one-sixth of the adult men in rural Mexico in the mid-1980s (CAW 1992). The expectation was that these now legal immigrant farmworkers would continue to leave their families in Mexico, where the cost of living was lower, and commute seasonally between homes in Mexico and farm jobs in the United States. The fact that legal SAW farmworkers could take nonfarm jobs, it was thought, would force U.S. growers to increase wages and improve working conditions.

Both assumptions proved to be false. First, many of those legalized under the SAW program moved their

Courtesy of the Huntington Library, San Marino, Calif.

Jack Kelly Clark

***Above*, In the late 19th century, Chinese field hands worked extensively in California agriculture. *Right*, In the 20th century, Hmong and other Southeast Asian refugees took up farming in the Central Valley.**

families to the United States in the early 1990s. Second, farm wages and working conditions did not improve as expected because unauthorized workers continued to be readily available. Third, the farm labor market changed. As the percentage of unauthorized workers rose in the 1990s, the risks that an employer would be sanctioned for labor-law and immigration violations also increased. Farm labor contractors (FLCs) emerged as risk buffers between farmers and farmworkers. FLCs proved willing to assemble crews of workers and to assume the payroll and other risks associated with farm employment.

Farm labor contractors. Every year, hundreds of thousands of farmworkers are assembled into crews of 20 to 40 for jobs that typically last for a few weeks on a particular farm (Taylor and Thilmany 1993; Rural Migration News 1998). FLCs and foremen or crew bosses have been described as the glue that holds the farm labor market together, because they serve as intermediaries between workers and farmers. In some cases, foremen or crew bosses are employed year-round by the farmer, and they recruit seasonal workers as needed. (In the scramble for workers, vans driven by *raiteros* act as a private transportation system in agricultural areas, ferrying workers between the farmworker sections of cities and fields.)

Each of the 1,300 FLCs registered in California in 1995 was required to obtain a license that costs $350 a year, post a $10,000 bond and pass a test on labor and pesticide laws (Rural Migration News 1999). Many FLCs are accused of taking advantage of vulnerable workers, levying unlawful charges for tools and rides to work, or not paying workers promised wages. Federal, state and local governments have erected an elaborate regulatory framework that attempts to encourage contractors and foremen to learn about and abide by labor and immigration laws, but there is considerable doubt about the efficacy of these laws. Between 1992 and 1995, a coordinated federal-state enforcement effort, the Targeted Industries Partnership Program (TIPP), found major violations committed by 90% of California FLCs inspected. A TIPP inspection of 23 FLCs with crews pruning vineyards in January and February of 1998 found that 52% of the FLCs were not paying their workers the minimum wage of $5.75 an hour (Rural Migration News 1999).

Unions. Unions have been active in California agriculture throughout the 20th century, but most have proved to be short-lived. For example, the Industrial Workers of the World was active before World War II, the Cannery and Agricultural Workers Industrial Union was active in the early 1930s and the UFW has been active since the mid-1960s.

In 1975, California became the first major agricultural state to enact a farm-labor-relations law under which farmworkers could choose, under state oversight, whether they wanted to be represented by a union. If farmworkers voted for union representation in state-supervised elections, farm employers were legally obliged to bargain with the union the workers selected. The California Agricultural Labor Relations Board (ALRB) has supervised 1,600 elections on farms and certified 10 unions to represent farmworkers on about 800 farms since 1975 (Martin 1996). However, there were fewer than 300 union contracts in 1999, and about 200 of the contracts cover fewer than 10 workers each on the state's dairies.

The best-known farmworker union today is the UFW, which had a peak of

A farmer from 1900 would be baffled by laser land-leveling, drip irrigation, vacuum cooling and the widespread use of computers, but would be very familiar with the use of bilingual contractors and crew bosses to assemble immigrant farmworkers to perform seasonal harvesting tasks.

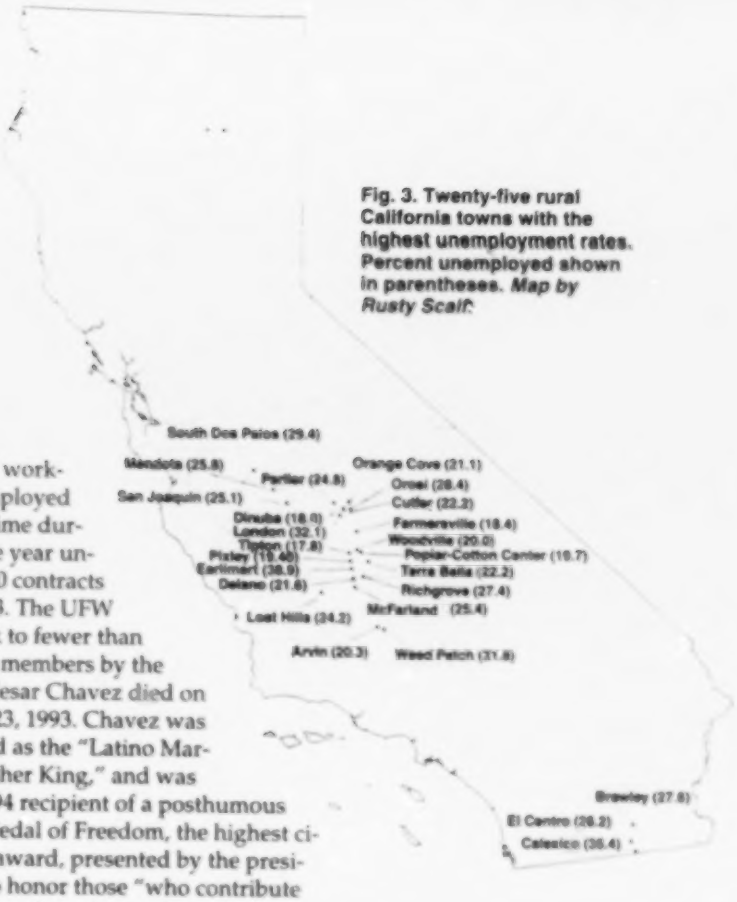


Fig. 3. Twenty-five rural California towns with the highest unemployment rates. Percent unemployed shown in parentheses. *Map by Rusty Scalf.*

67,000 workers employed sometime during the year under 180 contracts in 1973. The UFW shrank to fewer than 10,000 members by the time Cesar Chavez died on April 23, 1993. Chavez was praised as the "Latino Martin Luther King," and was the 1994 recipient of a posthumous U.S. Medal of Freedom, the highest civilian award, presented by the president to honor those "who contribute significantly to the quality of American life."

Chavez's son-in-law, Arturo Rodriguez, became president of the UFW. In 1994, the UFW repeated its 1966 Delano-to-Sacramento march and announced that it would once again become active in the fields, organizing farmworkers, as it had done from the mid-1960s to the early 1980s. The UFW launched its campaign to organize strawberry workers in 1996, and targeted Coastal Berry, the largest strawberry grower in the United States. A competing union, the Coastal Berry Farmworker Committee, received 725 votes in a June 1999 election, versus 616 for the UFW.

It is not yet clear what impact the apparent Coastal Berry defeat will have on the resurgent UFW. Since 1994, the UFW has been certified as a bargaining representative for California farmworkers on 15 farms that involve a total of about 3,500 farmworkers. The UFW represents about 50% of cut-rose workers in the Central Valley and 70% of mushroom workers along the Central Coast.

In addition to the UFW, there has been a significant increase in the activities of self-help farmworker groups. As more migrants from southern Mexico and Guatemala arrive, there has been a proliferation of ethnic organizations, some of which have been recognized as unions by the ALRB. For example, the Mixtec and Zapotec Indians in California from the southern Mexican state of Oaxaca have formed "civic committees" in a number of California towns.

Guest workers. In the early 1980s, the percentage of unauthorized workers among California farmworkers was 20% to 25%, and farm wages and benefits were flat or declining. In the late 1990s, the percentage of unauthorized workers among California farmworkers was 40% to 50%, and farm wages and benefits flat or declining. Farmers in the early 1980s and the late 1990s feared a new round of immigration controls, and argued that before such controls could be implemented or improved, a new guest-worker program would be needed.

California farmers argue that they need an alternative to the 50-year-old H-2/H-2A program, which requires employers who want to have guest workers legally admitted to work for them to first receive a certification from the U.S. Department of Labor that U.S. workers are not available, and that the presence of the foreign workers will not adversely affect U.S. workers. Growers prefer a different admission procedure, called "attestation," under which the farmer attests or asserts that he tried and failed to find U.S. workers; this attestation serves as a permit to admit foreign workers. Enforcement would come after the workers arrived in the United States.

Unemployment data seem to belie the need for a new guest-worker program. Unemployment rates in the California cities in which many farmworkers live are very high, often 20% to 35%, even in September when farm employment peaks (fig. 3). With one in three workers unemployed even at the peak of the harvest season, and experience that "in the past, many temporary guest workers stayed permanently — and illegally — in this country," President Clinton on June 23, 1995, issued a statement saying, "I oppose efforts in Congress to institute a new guest-worker or *bracero* program that seeks to bring thousands of foreign workers into the United States to provide temporary farm labor."

In July 1998, the U.S. Senate approved the Agricultural Job Opportunity Benefits and Security Act of 1998 (AgJOBS). AgJOBS would have substituted a registry run by the U.S. Employment Service for labor certification by DOL, and permitted farmers to obtain guest workers in an attestation-type procedure. Legally authorized farmworkers seeking farm jobs would have to register with local Employment Service offices. Growers would request workers from these registries and, if a farmer requested 100 workers and the register had only 50 available, the farmer would receive permission to have 50 guest workers admitted. Guest workers could stay up to 10 months in the United States, often shifting from one farm to another; if

they did a certain number of days of farm work each year for 5 years — the suggestions are 90 to 150 days — they could earn an immigrant status under bills pending in Congress.

The current H-2A certification program is growing slowly. In 1997, DOL certified the need for 23,352 H-2A foreign farmworkers, up from 17,557 in 1996 and 12,173 in 1994. In 1997, 62% of the jobs certified were in Southeastern tobacco, another 18% were in Northeastern apples and 7% were in Western sheep herding, including California. Many of the H-2A sheepherders in California are from Peru, Mexico and China. Most are paid $700 to $750 a month and provided with a trailer and food. They usually receive 2 weeks paid vacation each year, and group health and worker's compensation insurance. Each shepherd is usually assigned about 800 sheep.

Future in focus: No major changes expected

One remarkable feature of the California farm labor market is how little change there has been in basic parameters over the past century — using bilingual middlemen to hire crews of seasonal workers, and worrying about whether enough workers will be available next year. A farmer from 1900 would be baffled by laser land-leveling, drip irrigation, vacuum cooling and the widespread use of computers, but would be very familiar with the use of bilingual contractors and crew bosses to assemble immigrant farmworkers to perform seasonal harvesting tasks.

The CAW final report (1992) called for an end to "agricultural exceptionalism," or special immigration and labor laws for agriculture; a renewed effort to reduce illegal immigration; and better enforcement of the labor laws that protect farmworkers. Six of the 11 CAW commissioners were from California. The commission surprised many observers by not recommending a new guest-worker program, instead calling for additional federal and state services for farmworkers, including more housing and services to assure equal opportunities for farmworker children.

How these workers and their children fare in their new communities will depend on government policy decisions, especially critical while the economy is strong.

Immigration policy is the wild card in shaping the future of the California farm labor market. If new entrants to the farm work force continue to be immigrants from abroad, then U.S. immigration policy will determine the number and characteristics of farm workers in the 21st century. Farmworker numbers and characteristics, in turn, will determine pressures for wage increases and benefit improvements. Immigration policy, a federal government decision, is the key variable affecting how immigrant workers and their children are likely to fare in California's rural and agricultural areas.

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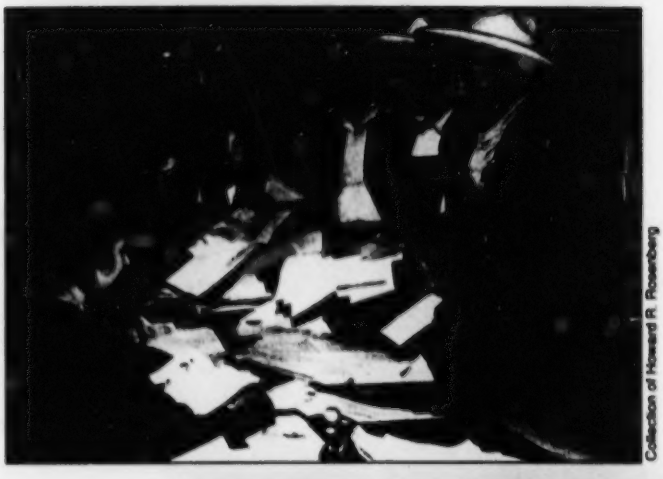

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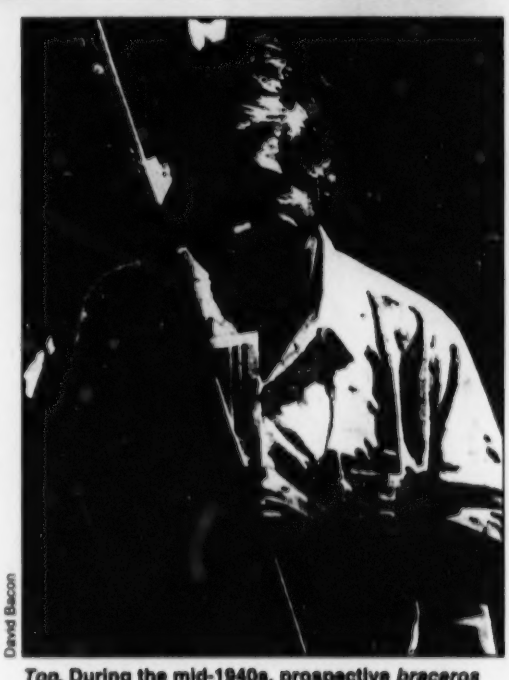

David Bacon

***Top*, During the mid-1940s, prospective *braceros* lined up for farm work in the United States at a Mexico City soccer stadium. *Below*, Cesar Chavez, who died in 1993, was a powerful advocate for the rights of farmworkers.**

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Jack Kelly Clark

Despite agricultural abundance, poverty is widespread in many Central Valley towns. *Photo by Phil Schermeister.*

The new rural poverty . . .

Central Valley evolving into patchwork of poverty and prosperity

J. Edward Taylor ⌟ Philip L. Martin

Jack Kelly Clark

From Redding to Bakersfield, the Central Valley is evolving into a patchwork of poverty and prosperity. Despite being part of the world's most prosperous agricultural economy, more than 25% of Fresno County's 800,000 residents were eligible for Medi-Cal in 1998. A study of 65 rural California towns indicates that labor-intensive agriculture contributes to poverty and welfare demands in rural communities by attracting large numbers of unskilled foreign workers and offering most of them poverty-level wages. In the 65 towns, 28% of the residents live in households with below-poverty incomes. Major policy choices for ameliorating this situation include modifying immigration and labor laws that affect farming to help farmworkers earn higher wages.

Jack Kelly Clark

Jack Kelly Clark

One of the poorest cities in California, Parlier's population is nonetheless increasing more than 4% per year. Mayor Luis Patlan (first from left) has succeeded in attracting new industries such as Maxco, which manufactures corrugated boxes. Maxco Vice President Dave Bryant (second from right) poses with three of the plant's 300 employees.

Parlier, a city of 10,400 about 20 miles southeast of Fresno, lies in the heart of the area that produces most U.S. table grapes, raisins and wine grapes, and tree fruits such as peaches and nectarines. In 1990, 86% of the population was Hispanic, and more than two-thirds of the local work force in the summer consisted of foreign-born farmworkers. The job pyramid is very steep, with a broad base of low-paying, seasonal jobs and only a few stable jobs at the top. The best jobs are in government, where wages are not influenced by local conditions. The second-best jobs are in the farmworker service economy, providing migrant and seasonal workers with housing, rides to work, meals and other services, often for cash in an underground economy. Most people are poor, but the receipt of welfare benefits is uneven, since many local residents, especially immigrants, are not eligible.

Despite being part of the world's most prosperous agricultural economy, Parlier is one of the poorest five cities in California, measured by the percentage of residents living below the poverty line. Paradoxically, its population is growing by more than 4% per year, as rural Mexicans see more opportunity in rural California than at home. Most immigrant farmworkers currently drift out of seasonal harvesting jobs after 10 to 15 years, and their children educated in the United States are unlikely to work the fields (Taylor et al. 1996).

Parlier is not unique; it typifies the challenges confronting California's rural communities at the start of the new millennium. The statistical findings presented below indicate that from Redding to Bakersfield, the Central Valley is evolving into a patchwork of poverty and prosperity, not into an

If current growth patterns persist, the landscape of inequality in rural California will become more pronounced in the future, as labor-intensive agriculture, fueled by immigration, produces profits on one side and poverty for farmworkers on the other.

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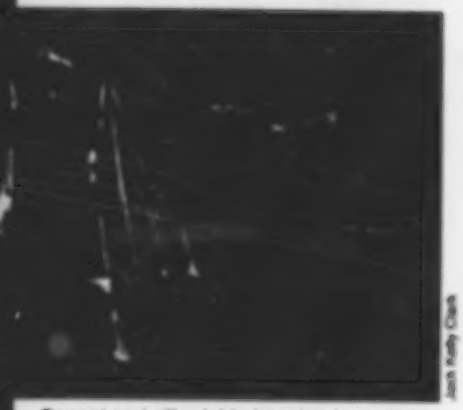


Jack Kelly Clark

Decent and affordable housing is available to seasonal workers in Parlier. Now officials are focusing on developing nonagricultural sectors of the local economy.

economy that offers upward mobility to all residents. If current growth patterns persist, the landscape of inequality in rural California will become more pronounced in the future, as labor-intensive agriculture, fueled by immigration, produces profits on one side and poverty for farmworkers on the other.

Population growth and poverty

When population and economic changes come together in agricultural areas, the usual challenge is to create enough good jobs for residents. The challenge is especially acute in the 450-mile-long, 75-mile-wide Central Valley. California's total population is projected to increase by 50% over the next 25 years (see p. 11). The population of the Central Valley, which numbered about 3 million in 1970, is expected to almost double to 6 million by 2000 and then to double again by 2025.

The Central Valley is often subdivided into three subregions:

- The Sacramento region (2 million residents), dominated by government and increasingly high-tech manufacturing and services.
- The northern Sacramento Valley (600,000 residents), with an economy based on agriculture and natural resources.
- The San Joaquin Valley (3.4 million residents), based on agriculture.

Future interactions of demographic and economic change affecting agriculture are likely to be most apparent in the San Joaquin Valley, which has the most productive agricultural system in the world but also two of the four poorest large U.S. metropolitan areas (population of 500,000 or more), Fresno and Bakersfield. Poverty is defined as the percentage of residents living in households with incomes below the poverty line ($16,000 for a family of four in 1997). Socioeconomic indicators for the San Joaquin Valley illustrate the challenge: about 30% of the adults have not finished high school, and 25% of the children in the Valley live in families with below-poverty-level incomes (California Department of Finance 1998).

Rapid population growth in the San Joaquin Valley is due to three major factors: immigration; high fertility, especially among immigrant women; and spillover population growth from the Bay Area and Los Angeles, including a growing commuter population in search of affordable housing.

Fresno County, the 10th most populous county in California, is the top-producing agricultural county in the United States in terms of value. But more than 25% of its almost 800,000 residents were Medi-Cal-eligible in 1998 (compared with 15% for California as a whole), and more than 12% received Aid for Families with Dependent Children/Temporary Assistance for Needy Families (AFDC/TANF) cash assistance (compared with 6.5% for California). Unemployment averaged 12% (versus 6% for all of California), yet farmers complained of labor shortages (Martin and Nyberg 1999). The status quo, in the view of many observers, risks the creation of a new rural poverty, as poor Mexicans migrate to agricultural areas where they have low earnings and limited mobility.

About 55% of the immigrants who arrived in the San Joaquin Valley between 1980 and 1990 were from Mexico (another 25% were from Southeast Asia). A combination of little education, low earnings from seasonal farm employment, and large households gave San Joaquin Valley immigrants from Mexico who entered the United States during the 1980s incomes of $3,700 per person in 1990. That is about the same as the per

capita income of Mexico but higher than the per-capita income of rural Mexico, where most of these immigrants originate (unreported income may be substantial, both in the United States and in Mexico).

Immigration, poverty and welfare

Immigrants in the 1980s and 1990s encountered a different California economy and labor market than those entering in previous decades. The emergence of the new information and technology-based economy means that now, more than ever before, education and skills are the prerequisite for economic mobility. These are precisely the characteristics most immigrants and many immigrant children in rural California lack.

The farm labor market also has changed. In the 1960s, after the termination of the *bracero* labor-recruitment program between the United States and Mexico, labor scarcity opened the door to unionization and rising real wages for California farmworkers. These economic advances for farmworkers were reversed in the 1980s and 1990s, as an elastic (highly responsive) supply of low-skilled labor from Mexico and a proliferation of farm labor contractors created surplus labor conditions (see p. 19).

Today, California farmworkers face not only declining real earnings but also a lack of housing and other benefits many once enjoyed. For these workers, real take-home earnings, after housing costs, have fallen substantially in the last two decades. Instead of living on the farms where they work, impoverished farmworkers and their families crowd into small rural towns, creating a new concentrated poverty there.

We used 1990 Census data on immigration, poverty and welfare in 65 rural California towns — containing a total population of 450,840 — to test the hypothesis that labor-intensive agriculture, by attracting large numbers of unskilled foreign workers and offering most of them poverty-level earnings, contributes to poverty and welfare demands in rural communities. Our sample included all incorporated municipalities with fewer than 20,000 inhabitants and at least 8% of their labor force employed principally in agriculture. Most of the communities in our study are located in the San Joaquin Valley, such as Parlier, McFarland and Huron.

Past research on economic impacts of immigration have focused on urban areas and considered only the one-way relationship between immigration and such variables as wages and unemployment rates. In contrast, we adopted an *interactive* approach, looking at how immigration both influences and is influenced by farm employment and tracing through the impacts on poverty and welfare use in rural towns (Martin and Taylor 1998).

The 65 farmworker towns in our study are small and poor. In these towns, 28% of the residents live in households with below-poverty incomes. Twenty-nine percent are foreign-born, and one-third of the foreign-born arrived during the 1980s. Labor-force participation is relatively low — an average of 36% are employed or looking for work. (By comparison, about half of the U.S. and California populations are employed or looking for work.) About one-third of the typical city's labor force is employed in agriculture, down from 50% in 1980. However, during the 1980s, the *absolute* number of people in farm jobs expanded by 17% in the average sample city (the share of labor force in agriculture fell because the number of people in nonfarm jobs increased more rapidly than the number in farm jobs).

Our simultaneous-equation regression analysis (see study methods below) uncovered a positive relationship be-

Jack Kelly Clark

Jobs in agriculture attract Mexican workers to California, but usually offer poverty-level wages.

Study methods

Simultaneous-equation regression analysis is widely used to estimate economic relationships involving more than two dependent variables (we attempt to explain the behavior of dependent variables with the model). In these cases, a regression equation is specified for each of the dependent variables. Our model has five dependent variables: immigration (the change in a community's foreign-born population between 1980 and 1990); the number of people living in impoverished households; the number of people in households with welfare income; the number employed in farm jobs; and the number in nonfarm jobs. These dependent variables are functions of independent variables (community population, foreign-born population, farm and nonfarm employment, and poverty at the start of the 1980 to 1990 period, etc.) as well as of each other (e.g., welfare use is a function of poverty; immigration is a function of farm employment and farm employment is a function of immigration; poverty is a function of immigration and of both farm and nonfarm employment). Because the dependent variables are all potentially interrelated, the five equations are not estimated independently, but rather as a system, using the three-stage, least-squares method. *–J.E.T.*

John Stambos

New subdivisions are springing up in and around Parlier, a small city about 20 miles from Fresno.

tween farm employment and both immigration and poverty. Other things being the same, a 100-person increase in farm employment was associated with 139 more people living in poverty during the 1980s. That is, the poverty multiplier of an additional farm job was 1.39. Farm employment increased poverty both directly, by offering farmworkers below-poverty earnings, and indirectly, by stimulating immigration of people with few skills.

The farm employment-immigration link was circular. Farm employment drew immigrants into rural towns, and immigration in turn relaxed the labor constraint on the expansion of labor-intensive agriculture, leading to the creation of additional farm jobs. Our findings show that each 100-person increase in foreign-born population added 37 more workers to farm payrolls during the decade.

Many residents and nearly all newcomers to these cities are noncitizens ineligible for welfare under the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA), the 1996 U.S. welfare reform, so there is not a one-to-one relationship between poverty and welfare. A 100-person increase in the number of poor residents was associated with a 57-person increase in the number of welfare recipients. There was no significant direct relationship between immigration and welfare use, which casts doubt on the Proposition 187 argument that immigration is motivated by access to welfare benefits.

The farm employment-poverty-welfare cycle is stronger in California than in the rest of the country, where, on average, agricultural production is less labor-intensive and farmers traditionally have less access to low-skilled immigrant workers. Farm employment reduced poverty in the United States during the 1970s, when farmworker wages rose and unionization was on the upswing. Other things being equal, an additional 100 farm jobs were associated with 43 fewer people in poverty and 52 fewer people in households receiving welfare income. The ameliorative effect of farm employment on poverty reversed in the 1980s: by 1990, an additional 100 farm jobs were associated with a 97-person increase in poverty and a 16-person increase in welfare use. At the same time, the role of immigrant workers, especially unauthorized immigrants, in the U.S. agricultural work force has increased (US Department of Labor 1993).

What does the future hold?

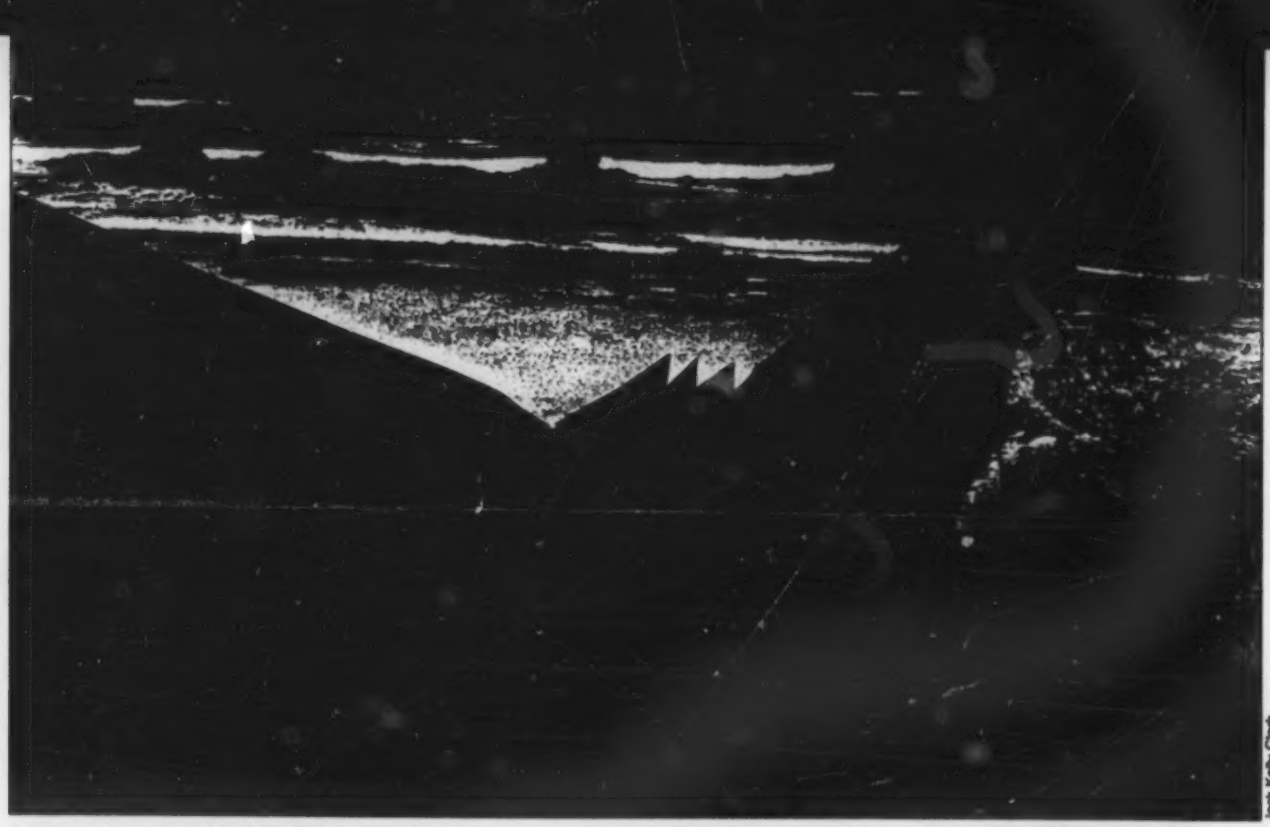
Our research findings suggest that there is a vicious circle of more farm jobs, more immigration and more poverty in rural California. What does this finding portend for California in 2025? How are policy initiatives, including immigration and welfare reforms, likely to reshape the state's rural demographic and social landscape?

California's future includes a vastly more populous San Joaquin Valley and an increasingly complex "rural" economy, as urban sprawl in centers like Sacramento, Fresno and Bakersfield and housing spillover from San Diego, Los Angeles and the Bay Area continue to take over California's fields. City and regional planning policies may alter the sprawl at its margins, but San Joaquin Valley population growth appears to be inevitable.

The range of policy options to reduce farmworker poverty in the next 25 years is bracketed by two extremes. One extreme is the guest worker option, which advocates bringing seasonal farmworkers into the United States in a manner that does not lead to settlement. This implies implementing more effective border controls so that individuals enter the country as guest workers who return home, instead of as unauthorized immigrants who might settle. The other extreme is not to worry about controlling immigration and settlement, but rather to adopt integration policies that uplift poor rural residents, including immigrants and their children, by improving economic mobility. Options in between these two extremes include unionization of the farm work force and better enforcement of labor and tax laws.

The major immigration-related policy initiatives of the 1990s attempted to restrict immigration with increased border enforcement while limiting access to public services through welfare reform.

Some researchers question the ability of border enforcement to control the flow of immigrant workers between Mexico and the United States, in light of a voracious demand for low-skilled labor in the United States and limited employment options in Mexico (Singer and Massey 1998). The Binational Study of Immigration, sponsored by the U.S. Commission on Immigration Reform and the Mexican Foreign Affairs Secretariat, concluded that tighter border enforcement increased, rather than decreased, the number of unauthorized immigrants in the United States during the 1990s. Most who attempt entry into the United States without proper documents ultimately succeed. However, a higher risk of apprehension at the bor-



Jack Kelly Clark

A USDA survey found that more than half of California's farm laborers during 1998 were unauthorized, despite fences along the U.S./Mexico border south of San Diego.

der encourages once-seasonal migrants to remain in the United States throughout the year and raise their families here, creating new public-service demands in California's rural communities (see p. 11).

The Immigration and Naturalization Service (INS) contends that its border enforcement strategy ultimately will prevail, but to date its primary impact has been on *where* immigrants cross the border, not on the number of individuals who cross (GAO 1999; CIIP 1999). The U.S. Department of Labor's National Agricultural Worker Survey found that 52% of California's farm work force was comprised of unauthorized immigrants in 1998. That is a higher percentage than on the eve of the Special Agricultural Worker program that legalized more than 700,000 California farmworkers — most of the state's agricultural work force — under the Immigration Reform and Control Act of 1986.

National welfare policy, as legislated by the 1996 PRWORA, has placed new restrictions on immigrants' access to welfare benefits (see p. 35). This raises concerns about the economic integration not only of poor immigrants, but poor citizens as well, including the U.S.-born children of immigrants. The Urban Institute estimates that nearly one in 10 American children lives in a mixed-status family with at least one noncitizen parent and one citizen child (Fix and Zimmerman 1999). If welfare reform reduces immigrant families' income, all family members, not only noncitizens, are affected. Moreover, it is not clear whether welfare reform has discouraged noneligible immigrant parents from seeking benefits for their U.S.-citizen children, who are entitled to public assistance regardless of their parents' immigration status. (Our study was conducted using data collected before welfare reform was passed in 1996.)

An overarching goal of PRWORA is to get individuals off of welfare and into the work force. However, there is a mismatch between welfare recipients and jobs in rural California. Virtually all new entrants to the farm labor force are young men who recently arrived from Mexico to do seasonal farm work. They are flexible and willing to travel to different fields each day and work long hours if needed. Most welfare recipients, on the other hand, are mothers with children who lack the flexibility that farm employers have come to expect (Rural Migration News 1997).

The networks linking U.S. farm jobs with new immigrant workers are better established than those linking farm employers with local welfare recipients. The farm labor contractors who hire and supervise at least half of all farmworkers have little incentive to form crews of welfare recipients, who may complain about violations of labor laws that farm labor contractors commit. In the 1990s, there was little evidence of generalized farm labor shortages that would encourage farmers to invest in recruitment and training of welfare recipients or tolerate less-than-stellar work habits (Taylor et al. 1996).

Because of these thorny issues, many local observers are pessimistic about welfare reform's prospects in rural California. Ernest Velasquez, retired Social Services director for Fresno County, says that "the goal of moving people from welfare to jobs in only two years is not realistic in the San Joaquin Valley. I'm not sure how

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Jack Kelly Clark

Technology has tended to focus on increasing the productivity of land, not workers.

you implement welfare reform in a place with no jobs" (Arax 1997).

Despite the absence of generalized farm labor shortages, California growers are intensifying their push for a guest-worker program at the new millennium. They cite INS claims that border and internal enforcement of immigration laws will eventually succeed in reducing the flow of workers across the border, as well as the reluctance of U.S. citizens to work in the fields. It is likely that the next 25 years will witness new experiments with federal guest-worker programs for agriculture.

Guest-worker programs have a number of strikes against them. First, in practice, they do not prevent immigrants from settling; hence the adage "there is nothing as permanent as a temporary worker." Second, despite policymakers' best intentions, guest-worker regulations are difficult to enforce in an agricultural economy riddled with immigration and labor-law violations (Martin 1998). Third, some observers bemoan the exclusionary nature of guest-worker policies, which defy the inclusionary ideals that created this "nation of immigrants." Finally, our analysis suggests that guest-worker programs would leave California's existing rural poverty intact.

The prospects for widespread unionization and significantly increased enforcement of labor laws also appear dim. In the 1960s, Cesar Chavez recognized the difficulty of organizing a foreign-born and constantly changing agricultural work force; he relied heavily on consumer boycotts to promote unionization. Today, fewer than 300 union contracts cover less than 5% of California farmworkers (see p. 19). The political will to enforce agricultural labor laws has waned, and the number of people involved in enforcing California's labor laws decreased in the 1990s due to cutbacks in government funding that have not been restored (Rural Migration News 1996).

Future in focus: The new rural poverty

Technological advances in California agriculture have focused on raising the productivity of land, not labor. This explains the high labor intensity of many farm operations, evident to anyone who observes, for example, a Fresno raisin harvest. Despite California's harvest of plenty, the productivity of individual workers is lower than it would be with more capital-intensive practices. For example, the driver of a tomato harvesting machine harvests far more tomatoes per day than a hand harvester could, and a worker using air-powered tools can prune trees and vines faster than a hand worker. This, together with a ready supply of new immigrants willing to work at low wages, keeps real wages for farmworkers from rising when the demand for field hands increases. The availability of inexpensive and flexible immigrant labor, in turn, discourages farmers and labor contractors from mechanizing and "stretching out" labor demands to provide workers with more stable employment. As a result, California's agricultural prosperity is reflected in the price of land, not labor. Herein lie the roots of California's new rural poverty. As Carol Whiteside, president of the Great Valley Center, put it, "The Central Valley will either wind up as a contributor to the state's economic development or it will wind up as California's Appalachia" (Rural Migration News 1998). If poverty amid prosperity persists, it may end up being both.

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The new rural Californians . . .

Gary M. Johnson

Gary M. Johnson

***Clockwise from left,* a new subdivision on McFarland's east side; home undergoing renovation; new building for St. Elizabeth's Catholic Church, dedicated to Our Lady of Guadalupe.**

Gary M. Johnson

Farmworkers putting down roots in Central Valley communities

Juan-Vicente Palerm

At times, rural agricultural communities have been viewed as chronically impoverished, overgrown labor camps with few prospects for improvement. The common wisdom is that costly public assistance will be needed to ensure the social integration of poor, undocumented, unskilled, uneducated, non-English-speaking, foreign-born farmworkers and their families.

Over the past 15 years, anthropologists with UC Santa Barbara have documented the settlement of former migrant farmworkers, mostly from rural Mexico, into California towns and communities located near important agricultural production sites (Palerm 1989, 1991). This ethnographic field research continues to examine the people who inhabit impoverished but rapidly changing agricultural communities (Garcia 1992; Krissman 1996; Haley 1997; Figueroa; Palerm 1999a, 1999b).

Despite undeniable conditions of persistent and concentrated poverty, the research paints a more complex picture. A dozen research sites, under study by anthropologists since the mid-1980s, reveal another less familiar facet. Many settlers have become homeowners and are transforming derelict structures into attractive dwellings. Of 72 immigrant families I began studying in 1989, 64 still live in the same community and 32 now own their homes (compared with 10 in 1989) (Palerm 1991). There is nothing transient about this behavior. Rather, it clearly demonstrates a stubborn determination on the part of young immigrant families to homestead and build new lives in rural California.

Likewise, unprecedented numbers of foreign-born rural Californians have sought and been granted U.S. citizenship in recent years. As a result, they are becoming more engaged in the local political life. A review of city Web sites shows that there is hardly a city council in California's agricultural heartland that does not include several Latino officials. New civic and nongovernmental, community-based organizations have mobilized to improve parks, churches, schools and other community institutions.

Revived towns often include new small businesses such as groceries, laundries, video rentals, repair shops, *panaderías* (bakeries), *carnicerías* (butchers), liquor stores, travel agencies, restaurants and discount stores. A 1987 business survey in Guadalupe, a farming town in Santa Barbara County, found that 30 of the town's 67 businesses were registered to Hispanic owners or operators. By 1999, Guadalupe had 194 businesses, 82 registered to Hispanics and the rest to Anglo, Portuguese, Italian, Japanese, Korean, Filipino or unknown owners. With these businesses, a new merchant class is emerging that demonstrates budding socioeconomic and occupational differentiation.

Likewise, many immigrant farmworkers and their children are becoming skilled and valued laborers as, for example, machinists, irrigators, chemical applicators, mechanics and

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Jack Kelly Clark

Some immigrants to Central Valley towns have become successful businesspersons, such as barbers, agricultural consultants or restaurateurs.

labor foremen. Some are employed by farm enterprises as crop managers, accountants, and sales and marketing representatives, while others have percolated up into state employment as farm advisors and crop inspectors. Immigrants have also become successful entrepreneurs as, for example, farm labor contractors and, against all odds, as independent farmers. Of the 72 families I began studying in 1989, most continue to carve out their existence from farm work, but seven are locally self-employed as a barber, beautician, two independent growers, two roofers and an auto mechanic.

The town of McFarland, located in Kern County at the southern end of the San Joaquin Valley, is a good example of the changes under way in rural California towns. When UC anthropologists first visited McFarland in 1986, they encountered a dusty, blighted community surrounded by profitable grape, almond, orange, kiwi, rose and cotton farms. Nearby industrial wineries, almond hulling plants, cotton gins, and state-of-the-art fruit and vegetable packing sheds further demonstrated the importance of agricultural investment and farm production.

On the east side of Highway 99, which divides McFarland into two parts, stood a collapsing Mexican "shantytown." The "better" west side showed clear signs of decay as former inhabitants took flight and new immigrants, mostly from the Mexican state of Zacatecas, crowded into the vacated homes. Only one business remained open in the once-busy downtown.

From 1970 to 1986, McFarland's population increased about 50% to 6,350, satisfying the growing farm labor demand but putting tremendous pressure on local housing, community services and schools. In short, McFarland looked a lot like an overgrown and overcrowded labor camp populated by transient and impoverished farmworkers.

McFarland's population has grown to more than 8,000 (in 1999), still mostly poor immigrant farmworkers from the Zacatecan towns of Huanusco and Jalpa. But many of the small, modest homes in the east side have been repaired and painted, giving the neighborhood an almost suburban look. A brand-new, oversized church devoted to Our Lady of Guadalupe stands prominently by the old Mexican *colonia*. Across the highway, the west side is undergoing a renewal, with a downtown redevelopment plan being implemented and many new businesses such as a Kaweah National Bank, McDonald's and Chevron food mart.

In the north end of town a *lienzo charro* (Mexican rodeo) has been erected which draws *paisanos* (countrymen) from throughout the southern San Joaquin Valley to spectacular shows and competitions. McFarland's high school has generated 50 teachers during the past decade; its cross-country track team has won the state championship seven times, a source of tremendous community pride. A new maximum-security prison in the south end of town offers a handful of new jobs to locals. All but one of the city council members, including the mayor, are Latino, as well as most of the city's planning committee. McFarland no longer resembles an overgrown farm labor camp, but rather a real and vibrant community peopled by immigrant farmworkers with many aspirations and the will to realize them.

The future prospects for California's rural immigrant communities are still uncertain and difficult to predict. Although we understand quite well the external social, political and economic forces that spawned them, we are nevertheless far from understanding their internal dynamics as real human communities and legitimate places in the state's realpolitik. One can safely assume that the population that inhabits these communities will continue to root itself into the agricultural landscape, as long as California farms continue to demand their labor.

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Suzanne Paisley

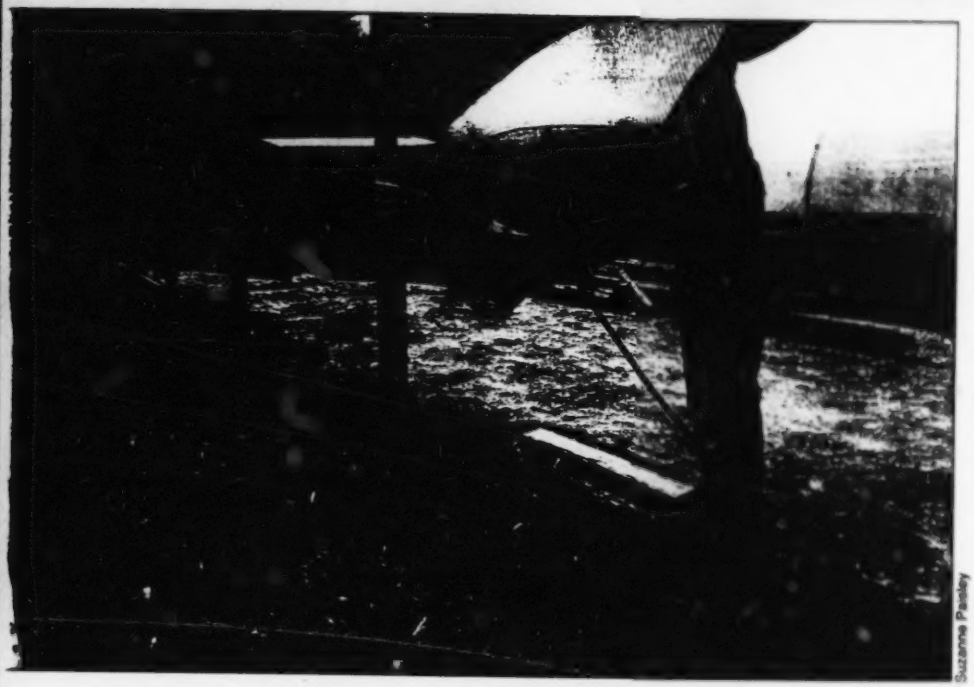
Federal welfare reform, which requires most welfare recipients to work, is reshaping social services. At the Butte Community Employment Center, which opened in 1998, resource specialist Anna Uribe serves employers and job seekers without regard to eligibility for any program.

Welfare reform shines a light on work-force development challenges

David Campbell

In August 1996, Congress passed sweeping reforms to the nation's welfare system, requiring most recipients to work and placing a 5-year limit on benefits. The California Communities Program at UC Davis has been studying the progress of welfare reform in six California counties, and comparing the state's experience to national trends. Through more than 200 interviews and an extensive literature review, we have found that welfare reform is succeeding in reducing caseloads and reinventing local social-service bureaucracies. But these changes must be joined with long-term job creation and work-force development strategies if they are to truly reduce poverty. California's welfare reform policies and experiences highlight the particular challenges facing rural counties, which generally have fewer staff resources, a less-developed infrastructure of nonprofit service organizations, and lower expectations about their ability to implement major reforms.

It has been more than 3 years since Congress passed the Personal Responsibility and Work Opportunity Reconciliation Act of 1996, calling for sweeping changes of the nation's welfare programs. Welfare reform ended the entitlement to welfare cash-aid, replacing it with a system of time-limited support that requires all nonexempt participants to work or participate in work-related activities. Aid recipients face a 5-year lifetime limit on benefits, and are sanctioned if they fail to comply with work participation requirements. This new focus on job readiness



Suzanne Parsley

While working at Butte County's Palermo Farm, Tina Pacheco learns about crop production, landscaping and the operation and care of farm machinery.

is creating a clearer picture of the work-force development challenges facing California communities, particularly in rural areas.

Aided by a strong economy, welfare caseloads nationally have declined by nearly half since the legislation was passed in August 1996, prompting prominent politicians to label welfare reform a success. Public opinion is overwhelmingly favorable, and most welfare administrators have jumped at the opportunity to bring government social programs into closer alignment with fundamental public values: the importance of work, self-discipline, and not getting "something for nothing." Reflecting on early welfare reform implementation at the local level, two long-time students of public administration state: "We have never seen, or expected to see, a period of so much and such pervasive institutional change in social programs" (Nathan and Gais 1999).

For the past 3 years the California Communities Program at UC Davis has been studying the nature of these changes as they unfold in California counties (see sidebar below). Like others, we have found that welfare reform is generating high levels of support and optimism. But the story of welfare reform's impact on communities is far from complete; nor is it a simple story of policy "success." Indeed, welfare reform is shining a light on work-force development and job-creation challenges that are sure to preoccupy local leaders for decades to come.

Welfare reform in California

California passed its own version of welfare reform, called CalWORKs (California Work Opportunity and Responsibility to Kids), in August 1997, later than most other states. As a result, counties had limited time for planning and had to rush to meet the state's implementation deadline in January 1998, before program details had been worked out. Local leaders have been "building the plane while flying it," creating new partnerships

About this analysis

Data for this analysis are drawn primarily from a comparative, longitudinal study monitoring implementation of welfare reform in six California counties: Butte, Kern, Sacramento, San Diego, Tulare and Ventura. Since February 1997, a California Communities Program research team has conducted more than 200 interviews with welfare, child-care and economic development officials, elected leaders, directors of nonprofit organizations, United Way representatives, community college administrators, members of the business community, leaders of faith-based organizations and others. We also draw on public documents, published welfare reform reports, administrative data, media accounts and related information.

One purpose of our study is to identify differences in urban and rural patterns, but the size and variety of California counties makes this extremely difficult. For example, the population of the six sample counties was 5,887,200 people in 1998, roughly equivalent to the combined populations of Indiana, Tennessee, Missouri and Washington. Their combined welfare population in 1997 was 110,355 persons, as large as the caseload in the entire state of Florida.

All but the most concentrated of California counties (such as Los Angeles and San Francisco) have some rural features, although county populations are usually quite large. In this report "rural" refers to the 37 counties that the California Budget Project (a nonprofit that conducts independent analyses of the state budget) labels as either "rural" or "rural/city," as opposed to the 21 counties they categorize as "urban" or "suburban." The rural/city category includes counties like Kern and Tulare, which have large cities within them, but are heavily reliant on agriculture. –*D.C.*

on the run, designing required program elements before complementary elements have been fully thought out, and granting front-line, social-service agency staff greater discretion before they are fully retrained.

The tasks counties face are daunting. These include reinventing the welfare bureaucracy and community-service delivery network around the new emphasis on employment; expanding support services such as child care, transportation and life skills; and developing new data-management systems that identify client job readiness and track work-related activities. All this activity is taking place under the pressure of tight federal timelines for meeting work participation quotas, and ever-evolving accountability requirements.

Early outcomes in the state are mixed. As of the 1998 to 1999 federal fiscal year, California had met the work participation rates required under federal law, avoiding (at least for now) the possibility of a hefty fiscal sanction. Welfare caseloads declined 30% between August 1996 and March 1999, a much smaller reduction than in most states (California is tied for 42nd among the 50 states). While many recipients are getting jobs, a good deal of the decline can be attributed to a low compliance rate. A CalWORKs evaluation by RAND, the Santa Monica-based think tank, found that half or more of recipients simply fail to show up for scheduled activities, often resulting in sanctions that take away the adult portion of their family welfare grant (RAND 1999). California is one of a handful of states that chose not to sanction the child portion of welfare grants. Some observers believe this encourages noncompliance, since recipients who are sanctioned continue to receive cash-aid for their children, do not have to participate in work activities and see their 5-year lifetime clock stop.

California counties initially feared the effects of welfare reform on county budgets, especially the prospect of increased General Assistance obligations, the final safety net for people not covered by other welfare programs. To date, however, welfare department budgets have actually swelled dramatically. The reason is that the county share of the state block grant is based on 1994 caseload levels, even though rolls have since declined dramatically. Per-client budget allocations rose 25% from fiscal year 1998 to 1999 alone. In Kern County, the human services department budget increased 51% due to increases in welfare reform spending (with no new county funds involved), while spending for cash-aid decreased $50 million due to reduced rolls. In fact, welfare departments are finding it hard to spend their entire block-grant allocations. The California Budget Project reports that in the current fiscal year counties (on average) are on pace to spend only half of their state allocations.

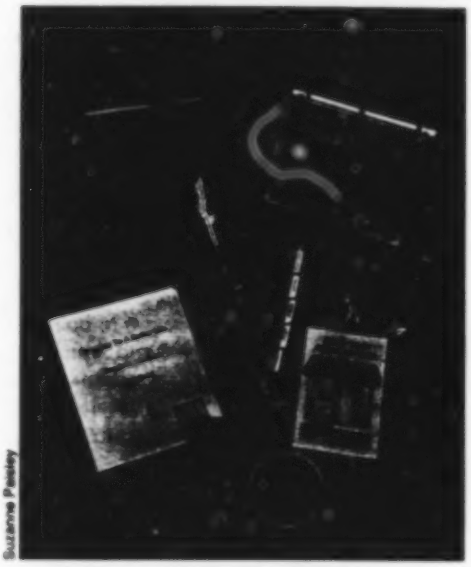
An issue of particular concern in California is the effect welfare reform has had on children in mixed-immigration-status families (those in which there is at least one noncitizen parent and at least one citizen child). A recent Urban Institute report found that the complex and sometimes competing goals of immigration and welfare policies often result in the denial of benefits to many eligible children (Fix and Zimmerman 1999). The authors note that 27% of all California children live in mixed-status families, compared with an average of 9% across the United States. Among all California low-income families with children, nearly one in three are mixed status.

The experience of rural counties

Rural counties face particular challenges in meeting the requirements of welfare reform (Garkovich and Irby 1998; Martin 1999). These include weaker governance capacity, higher rates of poverty, large numbers of seasonal jobs, and a decline in resource-based industries due to economic restructuring. Our research indicates that rural counties face three major governance challenges: (1) fewer staff resources to manage systems change of the magnitude required by welfare reform; (2) a less vital set of large and capable nonprofit service-delivery and planning organizations to draw on for support; and (3) a perception that they lack control over their own political and economic destinies, which can translate into greater hesitancy to launch major reform initiatives than more "sophisticated" urban counties.

Until now, a remarkably buoyant civic spirit has marked welfare-reform implementation.

Caseloads have declined rapidly in all California counties, but urban and rural distinctions are evident. In our six-county sample, the four "rural" and "rural/city" Central Valley counties (Butte, Kern, Sacramento and Tulare) lag behind the statewide average, and the two coastal "urban/suburban" counties (San Diego and Ventura) exceed it (fig. 1). A statewide comparison by the California Budget Project reveals that the 37 rural and rural/city counties lagged 5% behind



Suzanne Pasley

UC Cooperative Extension specialists developed the Gateway to a Better Life curriculum to help people make the transition from welfare to work. Topics include decision-making, job interviews, parenting, money management, work behavior and substance abuse. Materials are in English and Spanish. For more information, call (909) 787-5241; to order, call (800) 994-8849.

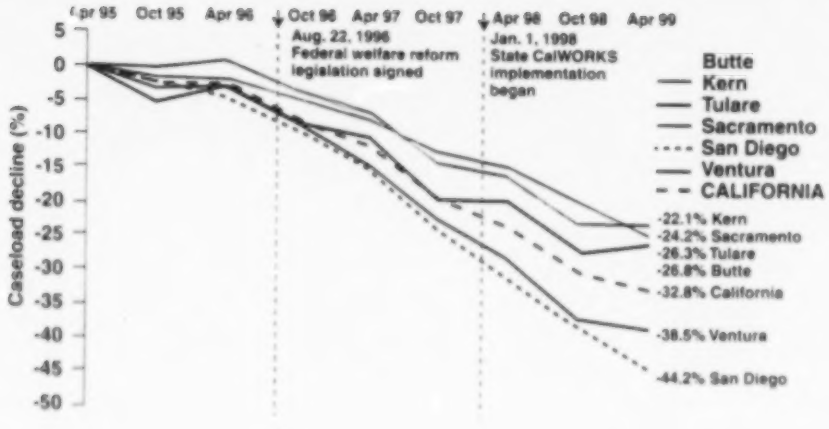


Fig. 1. Caseload decline comparisons in selected California counties, April 1995–April 1999. Source: California Department of Social Services, TANF Cashgrant cases.

the state average between 1995 and 1998, while urban/suburban counties exceed the average by 1%. The only national study of its type found that rural county caseloads are declining on pace with other areas (Rural Policy Research Institute 1999), but without the gains in labor-force participation rates or the decline in the working-age poverty rate experienced in urban areas.

As welfare rolls shrink and the CalWORKs population comes to include a higher percentage of "hard-to-serve" clients, the rate of decline in caseloads is slowing in all counties. As this happens, the gap between caseload reductions in the rural and urban counties has begun to increase. Between October 1998 and April 1999, for example, urban/suburban counties experienced an average caseload decline of 5%, while rural counties slowed dramatically to 1%. Among our sample counties, the gap is particularly evident, with San Diego's caseload dropping 10% in the 6-month period, and Kern's caseload essentially remaining level.

Caseload reduction by itself is not necessarily a good indicator either of county program performance, or of how well communities are meeting goals related to family self-sufficiency and reduction of poverty. A 1998 California Legislative Analysts Office report noted that improvements in client "work readiness" would be a better measure of program performance, but no such data currently exist. Short of that, it is difficult to sort out the respective roles of county economic health, pre-existing work readiness of clients, and program performance in achieving caseload reduction.

Another current unknown is whether rural counties will in fact face fiscal penalties for failing to meet work-participation quotas. It was relatively easy for lawmakers to write these provisions into federal and state law, but it will be much more difficult to stick to them in the face of what is sure to be persistent criticism of the unfairness of penalizing economically distressed counties and regions.

California-specific data on what is happening to those who leave welfare is not yet available, in large part due to the difficulty all counties are having in creating new client tracking systems. Welfare officials we interviewed paint a picture not unlike the results of a national "leavers" study conducted by researchers from the Urban Institute (Loprest 1999). That report found that half or more of those leaving welfare are finding employment, but typically in low-wage, no-benefit jobs that leave them struggling to make ends meet. Average wages are in the $6.50-per-hour range, far below the $8.36-per-hour wage that RAND calculates is necessary for a family of three in California to become ineligible for cash aid (RAND 1999), and much less than the $10- to $12-per-hour range which many consider the minimum for a living wage. Over one-third of those surveyed by the Urban Institute reported serious problems in providing their families with food, and 40% indicated problems paying rent.

To our knowledge, no researchers are currently tracking patterns of migration in relation to welfare reform. Hypothetically, welfare reform could either cause migration of rural welfare-to-work participants to cities in search of better employment opportunities, or migration of those sanctioned in cities to rural areas in search of more affordable housing. Anecdotal evidence from our interviews suggests that out-migration from California's rural areas is occurring, often to locations outside the state. For example, we have heard repeatedly that many Hmong refugees living in rural parts of the Central Valley have moved to the Upper Midwest or North Carolina. In Tulare County, where unemployment is in the double digits, both the County Office of Education and the Salvation Army run "train and transport" programs that relocate recipients to out-of-state job markets. The small-scale Salvation Army program targets urban areas with low unemployment rates, such as Las Vegas and Salt Lake City. The Tulare County MOVE (More Opportunity for Viable Employment) program supported the relocation of 130 families during the 9-month period ending in June 1999, many to meatpacking jobs in the Midwest. Other evidence of out-migration comes from Butte County officials, who point to a marked decline in public-school enrollments in the county as evidence. They caution, however, that recent business closings may have as much to do with this as welfare reform. While not in themselves conclusive, these examples suggest that the topic of welfare reform-related migration is ripe for more focused empirical research to ascertain actual patterns and their significance.

Workers and jobs

Until now, a remarkably buoyant civic spirit has marked welfare-reform

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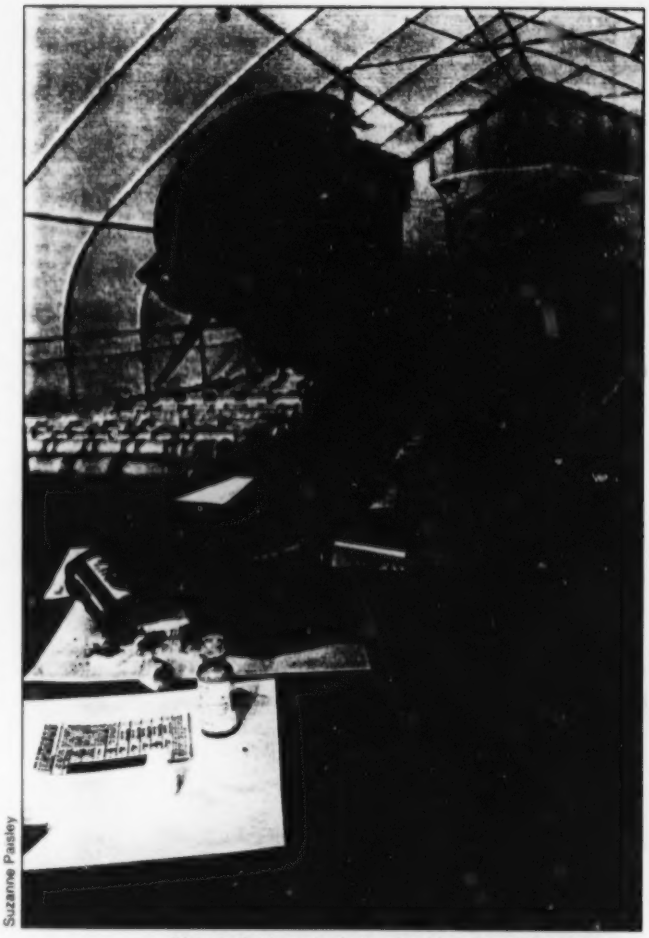
implementation. In both rural and urban areas, community leaders report an upsurge in civic conversation, and a multiplicity of new partnerships. These are fueled by a widely shared desire to seize the opportunity to "fix a broken system," and reinvent the work of welfare bureaucracies in terms that are more satisfying to caseworkers, clients and taxpayers. These partnerships also benefit from a rare convergence of increased county policy discretion at the same time that program resources are expanding. As an attempt to spur policy innovation in an area long known for recalcitrance and public divisiveness, welfare reform has clearly succeeded. But the success is bounded within limits set by economic circumstances and by the capacity of local service delivery systems to puzzle their way through issues of turf, jargon and control.

Two future scenarios are possible. In the first, and less desirable, the emphasis would continue to be solely on "work first" and on reducing caseloads, with little concern for long-term work-force development and job-creation strategies. Most of the "success" stories under welfare reform will graduate from cash-aid only to join the ranks of the working poor. In addition, the current program could create troubling inequities, since CalWORKs participants are eligible for subsidized child care, job training, community-service employment and case management, while the rest of the working poor are not.

Even more troubling is what could happen to the individuals who do not succeed under the "work first" approach. These include many individuals with disabilities, substance abuse and mental health issues, and victims of domestic violence. The good news is that welfare reform is providing the occasion for gathering clearer data on the extent of these problems among local populations. The bad news is that adequate treatment programs are often unavailable. Even where they are available, many of those most in need of treatment programs are being sanctioned for failing to participate in CalWORKs, and thus losing their eligibility for funded services. Over time, it is possible that the ranks of these "hopeless" individuals will grow in local areas, placing greater burdens on the community — particularly nongovernmental — safety net.

For rural areas, a narrow focus on caseload reduction would be particularly hazardous. Over the past two decades the trend has been toward an increasingly bifurcated economic reality in which urban areas with strong industrial clusters prosper while rural areas suffer by comparison. Our interviews suggest that rural leaders increasingly see their communities as sites for employers whose need for low-wage, low-skilled workers matches a local work-force that is poorly trained, and often lacking English language and basic math skills. For example, one county economic development planner told us they make a special effort to identify firms like warehouse distributors that are able to accommodate laborers without English or math skills. However necessary such actions may be in the short-run, they do not constitute an adequate long-range strategy.

A second, more hopeful scenario can also be envisioned. In this scenario local leaders adopt a long-haul perspective that emphasizes upgrading the local work-force, cooperating on regional economic development, and improving indicators of child and family well-being, such as the reduction of poverty. The Workforce Investment Act of 1998, less heralded than welfare reform but of equal long-term importance, provides a framework for more efficient and integrated delivery of job training services for all local residents, not just welfare recipients. Many counties are capitalizing on welfare re-



Suzanne Paisley

Suzanne Paisley

Above, **Soil analysis is one of many skills Mai Lee is learning at Butte County's job-training farm.** ***Below,*** **At the Northern California Food Service and Baking School, Kandy Rodriguez is being trained in all aspects of running a restaurant and full-service bakery.**

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Suzanne Paisley

Butte County's On the Job Training program assures Kathy Dabbs and all participants a job after they complete the training; employers pay half of the wages during the training period.

form as an opportunity to start building a more integrated work-force development infrastructure. For example, Butte County has built a one-stop Community Employment Center in Chico, which provides services to all county residents regardless of whether they are receiving welfare.

Better-integrated work-force development efforts will only succeed if local organizations can meaningfully collaborate, muting claims of turf and ego and focusing on the particular needs of the local labor force. One test will be the type of claims local actors make on state and federal officials. Historically, particular organizations seek deals that enhance their own standing without reference to broader community needs. More helpful would be to witness a unified set of local stakeholders who can petition higher levels of government for the specific changes in funding mechanisms and other regulations they need to advance cooperative goals.

A continuing challenge over the coming decades will be to initiate economic development strategies that are suited to rural regions and small town settings. Rural areas cannot use Silicon Valley as the model, nor should they be content as sites for telemarketing centers and warehouses. Models of sustainable economic development that take advantage of the resource base to create value-added approaches must be developed.

The question of how local communities can provide living-wage jobs, or some combination of low-wage jobs and subsidized public support, looms large for the future. Rural communities have serious disadvantages on the wage side, which are only partially offset by advantages in terms of a lower cost of living. Interestingly, while welfare reform has proved a financial windfall to county welfare departments, it has not, as a rule, generated an increase in county government employees. Many counties have continued downsizing, preferring to outsource new hiring to private or nonprofit contractors so that they are not stuck with employees if future revenues decline. Since government jobs are one of the few stable sources of middle-class jobs in many rural communities, this trend appears to exacerbate the labor market challenges already present.

Future in focus: Opportunities and challenges

Welfare reform and related aspects of policy devolution represent a significant opportunity for counties to advance beyond the weak-sister role they have normally played within American federalism. Currently, counties have increased both discretion and funding, making it possible to design and deliver programs that take unique features of local labor markets and the local work-force into account. For rural counties that continually struggle to implement preset programs more attuned to urban needs, this represents a significant opportunity. But the work-force development and job-creation challenges in rural areas are substantial. To succeed in the coming decades, they must build upon the popularity of the new "work first" emphasis in order to create community support for long-term public investments in education, training and job creation.

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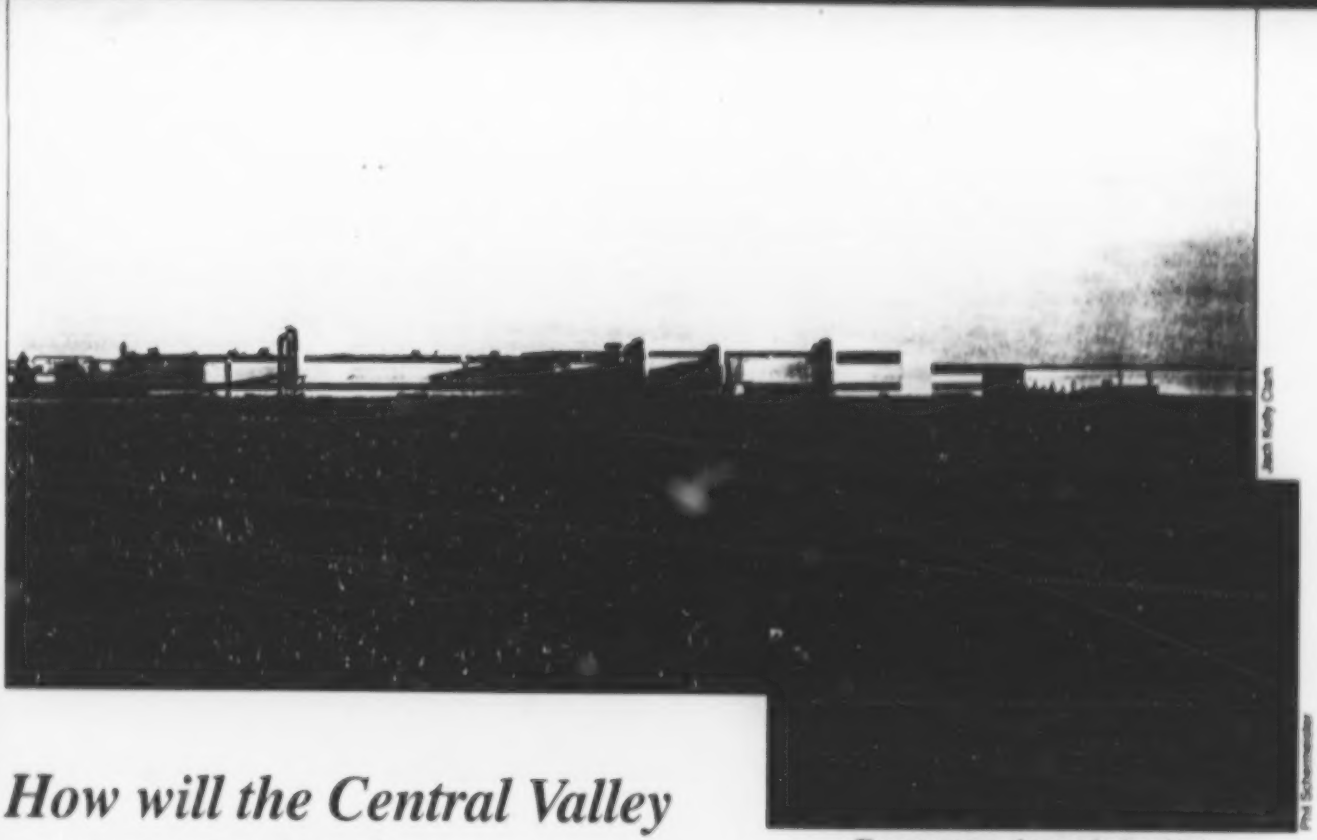

The emergence of nonagricultural industries, as well as spillover population from urban areas such as San Francisco, are transforming the Central Valley.

How will the Central Valley economy grow?

Ted K. Bradshaw

The Central Valley's economy is becoming increasingly bifurcated, with a new economy overlaying the traditional agricultural economy. Two distinctive economic forces are responsible for this transformation of the Valley's indigenous agricultural economy. The first is the continuing development of agriculture from commodity production to more specialized, integrated clusters of agricultural industry. The second is the emergence of nonagricultural industries, based on industries such as information technology and biomedical supplies. The health of the Valley's economy will continue to rest heavily on production agriculture, which supports many related businesses. However, the lack of workers possessing skills needed for the newer nonagricultural jobs may limit progress in Valley communities.

The Central Valley poses a challenging question about the source of continuing economic growth: agriculture is the region's major industry and agricultural employment is declining both in proportion and real numbers (especially farmers and nonseasonal workers; Carter and Goldman 1996), so how is it possible that the Valley population and economy continue to grow at rates greatly exceeding the state average? What is the source of growth in the Valley that promises to triple in population by 2040 (California Department of Finance 1993), making it one of the state's fastest-growing regions and threatening to pave over more than a million acres of farmland (Bradshaw and Muller 1998)?

California's growth and regional character involve the interplay of many different forces operating at the same time, often in the same area. The Central Valley is being shaped by migration, which induces jobs, and by economic growth, which attracts population. The most visible source of population growth is commuters, urban workers living farther and farther into the agricultural regions while working in the Bay Area or the Los Angeles Basin. Equally important, immigrants from Latin America, Asia and around the globe, as well as retirees and independent business persons, are attracted to the Valley for its affordability and lifestyle, as well as jobs.

Two distinctive economic forces are continuing to transform the Valley's indigenous agricultural economy into a new, growth-based, technology-

High-technology and information industries are part of emerging industrial clusters that will be the backbone of the Central Valley's future economic strength.

The transition to higher-value crops, such as almonds, demands more labor and specialized inputs.

driven, export-oriented, 21st-century economy. The first is the continuing development of agriculture from commodity production into an integrated cluster of agricultural industries. Alongside commodity production and primary processing, new industries such as fresh lettuce packaging or specialty almond products are part of a set of related agricultural industries that are almost as large and significant, and which multiply the impact of agriculture in the region.

The second is the development of a strong nonagricultural industrial base. Because it is still in a formative stage, the ultimate character of the nonagricultural base is difficult to know and predict. However, enough data now exist that its outlines are beginning to take shape. This new Valley economy is both integrated into and isolated from the state's "urban" coastal economies such as the Bay Area and Southern California.

The Valley's economy is bifurcated, with the new economy overlaying the older traditional rural economy. The Valley has its share of declining industries, workers displaced by farm mechanization, and people in inefficient workplaces without access to adequate investment capital. This old economy, which contributes to local unemployment rates that are double or triple the state average of just below 5%, includes many people who lack the skills and capacity to fully participate in the Valley's emerging industries (Bradshaw 1993). The new economy, with its demand for technical skills and information specialists, rarely draws from or benefits those who have their roots in the old.

The notion of industrial clusters is a useful analytical tool to describe these forces of change. Clusters are sets of interrelated industries in a region whose firms gain advantages because they are located near each other and because they share supplier and postproduction specialization that is unique to the area (Bradshaw et al. 1999; Held 1996; Porter 1995). Clusters have to do business outside the local area, and bring in money other than local money. The prototypical cluster is Silicon Valley, where research universities, innovative designers, chip manufacturers, production equipment companies and consumer-goods producers all gain advantages by being in the same region. Clusters are used to identify multiple, related industries that provide regional advantages and induce growth. This report covers a 20-county area from Shasta to Kern counties, and uses data from the California Labor Market Information ES202 workers data files, which include all workers except those self-employed. The most recent data available are for 1996 and comparisons are made to 1991.

The agricultural cluster

Agriculture is the Valley's largest employer, but the complex, multilevel, integrated development of this industry is what makes it strong. Agriculture accounted for over $3.4 billion in sales in 1997 in Fresno County alone, and in the eight-county San Joaquin Valley area, production came to $14.4 billion (CDFA 1998).

Based on fertile soils and ample water, agricultural production for many California crops leads the nation. The primary dynamic in California agriculture, however, is the increasing transition to higher-value crops such as wine grapes, stone fruits, almonds or organic vegetables, which on average require more labor. In general, the increases in labor demanded for specialty high-value crops compensate for the ongoing labor savings from mechanization that continue to displace farmworkers from routine tasks and from lower-value crops. More significantly, the new crops also require more specialized inputs, more elaborate processing, and increased reliance on information from researchers, consultants, investors, marketers and their specialist infrastructure.

Agricultural infrastructure. The foundation of the Valley's agricultural cluster is the natural resource base and the specialized physical and social infrastructure that supports supplier industries, which in turn support production of commodities, which are further processed and finally marketed (fig. 1). The Valley's unique water, soils and climate give agriculture an advantage, but value is multiplied because of the social infrastructure of support specialists in agricultural research, law, banking and financing, crop insurance, commodity brokering, soil testing, industrial technologies, marketing, accounting, tax advising and many other businesses. It is hard to quantify employment in this sector, however, since most specialties are not separated from their institutional settings.

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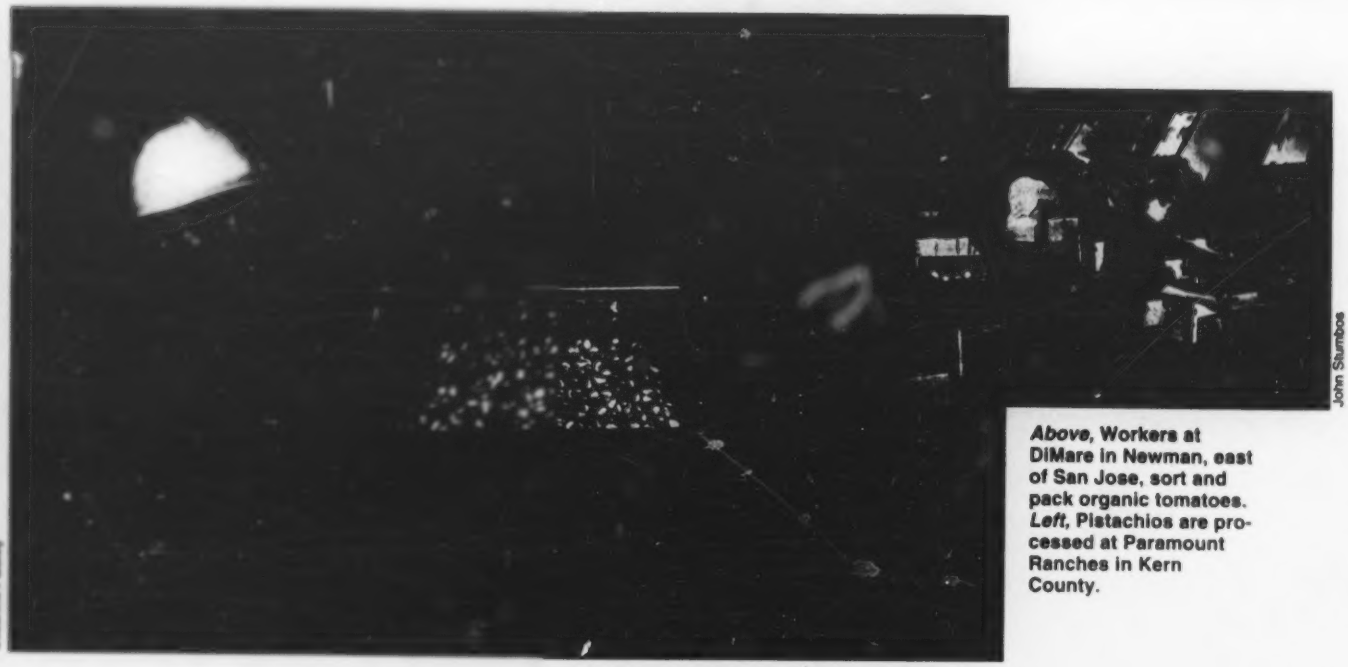

John Stumbos

Above, **Workers at DiMare in Newman, east of San Jose, sort and pack organic tomatoes.** ***Left,*** **Pistachios are processed at Paramount Ranches in Kern County.**

The critical contribution of the specialist infrastructure is the qualitative advantage that it provides for innovation in new crops, processes and products. UC is one of the most visible infrastructure components for its contribution of agricultural research, but partnerships with the private sector multiply the impact of campus-initiated efforts. For example, cooperative research led to integrated pest management and sustainable farming systems that are proving not only viable but economically attractive.

These innovations are available in the Valley because of the huge market for specialized research. The specialist infrastructure helps stimulate concentrations of agricultural producers and suppliers who can utilize increasingly specialized services. In turn, a growing specialized production industry creates more opportunity for further expansion of a specialized infrastructure. This gives the Valley's agricultural cluster its advantage.

Specialized support services. At the second level in the cluster (fig. 1), are specialized suppliers of agricultural services, materials and equipment (table 1). Table 1 lists only the industries that are significantly "over-represented" in the Valley as indicated by a concentration factor higher than 1.0. The concentration factor is also known as a location quotient, the ratio of the percent employment in a particular industry in the local area divided by the percent employment in the same industry in a larger region such as a state.

Specialized suppliers of production materials and equipment include fertilizer plants, seed producers, pesticide and other chemical manufacturers, irrigation-equipment suppliers, and producers of planting and harvesting machinery. Agricultural machinery and chemicals employ 1,661 and 1,583 workers respectively, and these two industries both have a concentration factor of more than 3.0, which means that these industries are at least three times more concentrated in the Valley than in the state as a whole.

In the production services sector, the Valley has a predictable concentration in farm labor (production workers hired by labor contractors rather than farm managers). In addition, crop services employ more than 28,000 persons, including aerial dusting, orchard cultivation, entomological services, planting- and harvesting-machine operation and other jobs. These specialty services are used by multiple farmers and provide services that would be difficult for individual growers to provide for themselves. Veterinary services for farm animals and poultry also make significant contributions to the Valley agricultural industry.

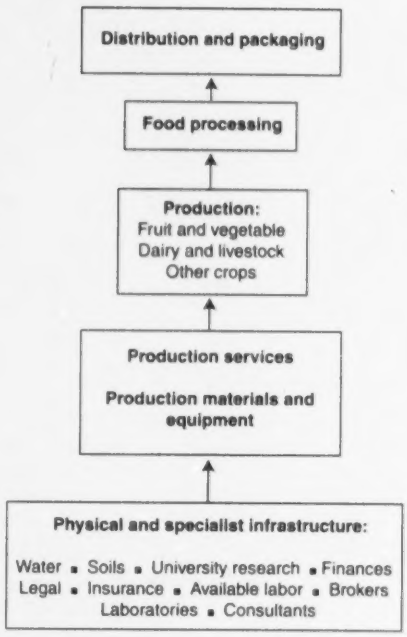

Fig. 1. The agriculture infrastructure cluster.

Production and processing. Production in California agriculture is the focal point of the cluster. Employment can be broken into three large, interrelated industrial clusters — fruits and vegetables, dairy and livestock, and

other agricultural crops (table 1). The Valley agricultural cluster processes, packages and distributes what the farmer grows. These industries employ nearly 100,000 persons, mostly in the processing of fruits and vegetables. Canning and freezing are only the first parts of the processing industry, with increasing numbers of firms making convenience and gourmet foods. A growing segment of this industry is aimed at export around the world. Almond processing in the nut industry, for example, is highly concentrated and growing considerably.

In sum, agriculture is still the core of the Valley economy. The Central Valley had a total of 1.5 million employed persons in 1996, with farm work comprising about 12.5% of the total. Another 135,000 people are employed in other parts of the cluster, in production materials, equipment and services as well as food processing, packaging and distribution. These related jobs constitute an additional 9% of total Valley employment. In total, these sectors conservatively represent a solid core of between one-fifth and one-quarter of Valley employment. The newer industries in the agricultural clusters, such as production materials and services as well as some processing industries, are also showing positive growth. However, even with this advantage, the data also show that newer industries are not pulling the older production, or commodity, part of the cluster to a faster growth rate than Valley employment overall.

John Stumbos

Castle Air Force Base in Merced County was vacated by the military in September 1995, but is experiencing new life. An aviation museum occupies 18 acres of the 2,800-acre facility.

TABLE 1. Employment indicators for major industries in the agriculture cluster, Central Valley, 1996

Description	1996 employment	Concentration factor	Change between 1991 and 1996
			%
Total for all industries	1,556,158	1.00	9.06
Agricultural industries packaging material	16,670	0.85	3.55
Glass containers	1,810	3.29	-12.90
Wood containers	1,355	1.91	18.44
Metal cans and shipping containers	1,273	1.69	4.86
Distribution and other services	25,844	1.04	-7.99
Grain and field beans	646	4.91	-61.55
Farm-product raw materials	1,778	4.61	-57.84
Food processing	60,261	2.44	-0.37
Cottonseed oil mills	573	7.21	1.78
Salted and roasted nuts and seeds	2,536	6.44	166.95
Rice milling	1,015	6.08	6.62
Cereal breakfast foods	778	5.01	-17.15
Meat products	9,816	3.95	-16.40
Wet corn milling	113	3.81	-0.88
Preserved fruits and vegetables	23,042	3.48	-4.70
Fats and oils	1,086	3.19	22.85
Sugar and confectionery products	4,453	2.99	45.81
Grain mill products	3,326	2.99	0.88
Dairy products	5,059	2.66	5.95
Wines, brandy and brandy spirits	4,476	1.95	-7.71
Beverages	7,313	1.64	-0.64
Production	102,279		
Fruit and vegetables	84,910	3.76	na
Dairy and livestock	14,744	4.14	na
Other	2,625	5.03	na
Production materials and equipment	5,732	2.04	6.90
Farm and garden machinery	1,661	3.96	1.28
Agricultural chemicals	1,583	3.09	22.62
Packaging machinery	668	1.94	10.23
Food products machinery	689	1.54	-3.64
Conveyors and conveying equipment	286	1.37	-17.10
Pumps and pumping equipment	767	1.28	4.78
Production services	118,437	4.73	58.70
Farm labor and management services	89,518	5.02	73.81
Crop services	28,131	4.07	27.58
Irrigation systems	202	3.25	-56.65
Soil preparation services	586	2.53	-3.78
Veterinary services	3,316	1.27	20.36
Animal services, except veterinary	990	1.26	-28.47

Source: Applied Data Economics, data from MIG ES202 county data files.
Note: Concentration factor (also called the location quotient) compares the concentration of employment in the Central Valley relative to California. A factor above 1.00 indicates that the Central Valley has a higher employment concentration than California in a particular industry, while a factor below 1.00 indicates a lower concentration.

Nonagricultural clusters

While the agricultural cluster is the dominant economic base in the Valley, agriculture does not account for all of the Valley's strong economic and population growth. New industries are emerging. Unlike agriculture, which has strong vertical linkages to its support industries, the new industries are more geographically specific and are "emerging" in clusters whose regional advantages are underdeveloped.

TABLE 2. Change in Central Valley employment, 1991–1996

Regional clusters	Change
	%
North Valley (total)	5.17
Biomedical	21.08
Machinery	16.23
Metals	11.38
Agriculture	3.96
Mid-Valley (total)	10.07
Information technology	81.24
Information processing	32.64
Biomedical	17.35
Machinery	18.62
Metals	16.09
Agriculture	-2.27
South Valley (total)	9.01
Information processing	18.35
Computer data processing	50.91
Biomedical	12.31
Metals	8.43
Agriculture	19.67

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John Stumbos

Dozens of private businesses have created new jobs at Castle. Truck manufacturer Alico Inc. employs about 150 people. *Above right,* The Challenger Learning Center, opened in 1996, has plans to serve 15,000 students and 500 teachers in the San Joaquin Valley.

This discussion focuses on three regions — the North Valley (Colusa to Shasta counties), the Mid-Valley (Sutter to Sacramento) and the South Valley (San Joaquin to Kern) — and emphasizes the industries that may form the core of the new economy (table 2). For example, transportation, tourism and utilities have grown in the Valley, but they lack a core of support industries that would make them a cluster. Similarly, the "nonbasic" industries that only serve local populations are not considered a cluster because they do not bring wealth into the Valley. Likewise, local government, construction, retail stores and most transportation services have large employment levels, but they are responsive to the wealth generated by other industries. The key to identifying the nonagricultural economic strength of the Valley is to identify the primary "motors" of growth. The first place to look is in the diversification of industries that have regional, national and global markets.

Castle Air Force Base in Merced County may illustrate the dynamic quality of diversification going on in the Valley. In 1995, the base closed and nearly 6,000 employees were relocated to other areas or lost their military jobs. While the displacement was only a minor economic setback for the county (Bradshaw 1999), an interesting, dynamic transition is taking place in base reuse. The Castle Joint Powers Authority, formed to redevelop the base, initially leased some of its warehouse space to a food processor for storage. But later, Pacific Telesis moved its service center, which currently employs more than 1,000 workers, to the closed commissary and other buildings. Then a construction firm located on the base because it needed lots of open space for construction and storage of portable buildings for classrooms. This firm now employs 500 workers. New recreation-education firms also found space at the base — for example, Aviation Challenge employs 45 in an educational space camp for kids. For a time, a blimp manufacturer found space at the closed airbase. The new firms were largely in growth industries rather than local relocations, and most of the jobs were new to the county. Virtually all of the firms draw revenue from outside the local area.

While the industries reusing Castle Air Force Base do not yet show promise of developing into an independent cluster, the mix of new industries illustrates the dynamic diversification of the new Valley economy. Telecommunications, recreation, education and new forms of construction are supplementing and indeed overlaying the traditional economy.

While these nonagricultural clusters have been growing fast since 1991, they are not yet concentrated at high levels. However, each has some component of local supply strength, which implies continued growth potential (table 2).

Information and electronics. First, in the Mid-Valley, the information technology cluster continues to expand, led by the electronics industry northeast of Sacramento. In this subre-

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John Stumbos

The information-technology industry is expanding rapidly in the mid-Central Valley region. Pacific Telesis signed a 20-year lease at Castle Air Force Base.

gion, the core of the information technology sector now employs 8,200 workers and expanded 142% between 1991 and 1996. The part of the cluster that supplies components and services for the information technology industries employs another 9,800 persons and expanded 50%. In short, this industry is helping drive the Mid-Valley economy. Along with state government and associated professional service industries, it is not surprising that the Mid-Valley is growing so strongly.

Biomedical/health. The Mid-Valley electronics cluster is also strongly linked to the biomedical/health industry cluster, which employs 68,000 persons, one in every eight employees in that area. Between 1991 and 1996 the cluster grew 17% compared to the region's overall rate of employment growth of 10%. Within the cluster, specialties such as drug manufacturing now employ nearly 600 persons, and medical instruments and supplies employ another 775 persons. Furthermore, links with the electronics industry in the Mid-Valley support growing employment in medical and hospital equipment and measuring-and-controlling-device manufacturers, which now employ 1,500 persons. These two industries both had over 50% growth from 1991 to 1996. The high-technology capacity of the Mid-Valley is evident in the new industries. These clusters build on the universities and government agency facilities in the region, and promise to become an increasingly strong part of the Valley economy.

Diversification. The North Valley has the least developed nonagricultural clusters compared to other Valley regions, but is showing signs of diversification. Fabricated metals and machinery clusters are emerging as important industries. Both of these have relatively small employment, but together they now employ 2,300 workers, up 11% and 16%, respectively, from 1991. The North Valley's biomedical cluster has grown 21% from 1991 to 1996. While it is not a major part of the state's medical industry, it now employs nearly 18,000 persons, nearly 10% of the regional employment. The most rapid growth is in several highly specialized industrial sectors such as medical instruments, measuring-and-controlling devices, hospital equipment and patient care services.

Computers and data processing. The South Valley remains particularly strong in its agricultural base, which expanded by nearly 30%. Even so, nonagricultural clusters are emerging. What stands out in the South Valley is the information processing cluster, which now employs over 17,000 persons and grew at a rate of more than 18% from 1991 to 1996, double the 9% rate for the region as a whole. Leading the employment growth in this cluster is computer and data processing services, which posted a more than 50% increase from 1991 to 1996. The information industry is highly visible here, as back-office data processing firms fill the many new office buildings and industrial parks in Fresno, Bakersfield and Visalia. The primary requirements for information processing is the labor force and high-capacity telecommunications systems. Businesses are attracted to low-cost office space, high quality of life, and adequate training programs to supply labor.

The South Valley also shows expanding biomedical employment. Medical instruments and supplies and ophthalmic goods lead the sector, which grew at a 30% rate. Overall this biomedical cluster employs nearly 85,000 persons in the South Valley, though most of that is in health services. In parts of the South Valley, medical specialization is becoming stronger over time. For example, a concentration of medical instruments and supply firms and ophthalmic suppliers grew 70% between 1991 and 1996, well over the state growth rate for these types of firms. In sum, the data show a consistent pattern of growing strength in the Valley in high technology and information industries. These emerging industrial clusters will be the backbone of the Valley's future economic strength.

Future in focus: Challenges for the new economy

The Valley faces several challenges with its growing high-technology economy. First, the core is in agriculture and will probably remain so for the foreseeable future. However, agricultural production and its support services, which are the backbone of the agricultural infrastructure cluster, are in a delicate balance. These specialized services and expertise are located in the Valley because agricultural production is vibrant there; they provide competitive strength for the Valley, as they represent an investment that benefits local farmers as well as people outside the region.

As in most clusters, the firms that provide technical skills also serve firms outside the cluster area, creating an export commodity that actually brings in additional wealth. However, if agricultural production weakens or no longer nurtures its specialized infrastructure, then the cluster will begin to decay and move elsewhere. Reduction in water supply or urbanization — including land-use changes that convert farmland to urban uses or that allow large zones of conflict around urban lands — could significantly limit the production that fuels related service industries (Sokolow and Spezia 1992).

Second, the Valley's emerging economy is specialized, complex and rapidly changing. It is built upon skills and information. However, the Valley lacks an abundance of highly skilled

workers. Workforce development remains a serious challenge. Throughout the Valley we hear stories of employers who can not find the skilled workers they need. As a consequence of large numbers of workers who have communication difficulties and insufficient education, progress toward a new economy is limited in many Valley communities (see p. 26). In addition, seemingly unsophisticated jobs such as warehouse workers are hard to fill because they now involve some quantitative and computer skills. In one case, a warehouse employer reported that the company could hire only one in 20 applicants because they lacked adequate language and arithmetic skills, or had recent criminal or drug records.

While the Valley's limited educational and work-force preparation programs may restrict future economic growth, more likely it will perpetuate the bifurcation that has characterized rural areas. Underskilled workers fail to find a place in the new economy and are increasingly bypassed, while workers from the high-technology urban centers are encouraged to relocate to the Valley. The new UC campus in Merced may help produce some of the higher-skilled workers needed for emerging industrial clusters, but the benefits from a new campus are years or decades away and will probably not help displaced workers who are bypassed by the new economy.

Finally, there is no guarantee that any of the clusters present or emerging in the Valley will be able to successfully compete and become international centers for excellence and innovation over the next 25 years. The stakes and risks are high: while the potential for development is real and the possible benefits are great, these industries face stiff competition from the coastal regions in California.

Students improve their skills in math, science, aerospace technology, problem-solving and teamwork at Castle.

The California Economic Strategy Panel (1996) noted:

> California's economy has changed in fundamental ways in the past decade and California's business, government, education and community leaders must respond in equally fundamental ways if the state is to retain its competitive edge in the 21st century. In short, California needs a new model of collaborative governance that fits the new realities of a 21st-century economy.

Since companies can invest anywhere in the world, a new role for government in the 21st century will be collaboration with public and private partners, including universities, to assure that there is specialized infrastructure in place to support the clusters that will sustain the economy and lifestyle of Valley residents. For instance, government agencies that issue permits and regulate zoning, labor and safety, must increasingly act in cooperation rather than in isolation. Public agencies that provide work-force training, economic development, and welfare must work in partnership with private firms to set goals for the investment of public funds and allocation of staff efforts. Cities and counties must also overcome local competition and begin to collaborate with each other to build regional excellence. Knowledge and technological innovations from universities must be shared broadly to develop the regional advantage that will foster clusters. In these ways, success of the new Valley clusters will depend on building a strong foundation of collaboration among the many public, private, and university interests that traditionally have been in competition.

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'Third' institution needed to bridge family-school gap for youth

Stephen T. Russell

California's youth of the new millennium will be the first adults to have grown up in a truly multicultural society; their experiences as children will set the stage for the leadership that they will provide beyond our lifetimes. Along with dramatic changes in the racial and ethnic composition of the state's population, the next 50 years will also bring significant changes to family life. These changes have profound implications for public education and civic involvement. A new, "third" social institution is needed to encourage youth in meaningful developmental activities when they are not at home or in school, and to prepare them for life in a diverse society.

As we cross the threshold into a new millennium, we are witnessing dramatic changes relevant to the well-being of children and youth in California. This special issue of *California Agriculture* focuses on population growth and change, with emphasis on the ways that the shifting populations of racial and ethnic groups will forever alter life in our state. Population change has obvious relevance to California's youth population because the first evidence of these shifts will appear in this segment of our society. Perhaps more importantly, California's youth of the new millennium will be the first adults to have grown up in a truly multicultural society; their experiences as children will set the stage for the leadership they will provide beyond our lifetimes.

In addition to changes in the racial and ethnic composition of the state (see p. 11), we also are witnessing continued demographic and lifestyle changes to family life, and hence youth and family well-being. Increasing numbers of nontraditional families and the growing demands of labor-force participation on today's parents are changing the context for childhood and adolescence unlike any other in history. These changes bring with them profound implications for public education, and for managing the lives of young people during the times between school and family guidance. Finally, we are seeing a shift in the ways individuals and communities think about youth and youth development. Rather than viewing "youth issues" as lists of the problems that adolescents experience (focusing on teenage

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With changes in family structure and increased work demands on parents, young people are spending more time unsupervised. By 2025, California will have 14.5 million children under 18 such as these Suisun City teenagers, *left*, and Fresno teenagers, *above*. *Photos by Michael Macor*/San Francisco Chronicle.

pregnancy, substance abuse, or school failure and dropout), more people are beginning to imagine youth as resources for their families and communities.

New realities for youth in 2000

Rapid population growth defines many of the changes facing California in the coming decades. Much of that growth will be within the youth population (fig. 1). There are 9.35 million children and adolescents (the population under the age of 18) in California at the turn of the century; that number is expected to grow to 14.5 million by 2025 (US Census Bureau 1999). While one in eight U.S. children under age 17 reside in California today, by 2025 one-fifth of the nation's children will live here (Children Now 1999). This represents unprecedented growth in an average lifetime.

The majority of growth among the nonadult population will be among groups that have traditionally been racial and ethnic minorities. Forty-year projections for California illustrate a dramatically growing youth population, one that will be predominantly Hispanic as early as 2010, and overwhelmingly so in less than 40 years. Over the last 15 years, Asian-American youth have become equal in number to African-American youth; by 2040, there will be 2.5 times more Asian American than African-American. Anticipating these changes, the very meaning of "minority" can no longer be based on nonwhite racial, religious or cultural groups with small population representations. Further, the growing population of nonwhite youth will have strong ties to Hispanic and Asian cultures. As these children grow up in California, they will reinforce community cultures that blend Hispanic, Asian and Anglo-American traditions. Thus, as we look toward the future, California has the potential — and opportunity — to become the first racially and ethnically integrated, and thereby truly multicultural, modern Western society.

In addition to dramatic changes in the cultural composition of the state, other demographic changes are taking place that have important implications for youth. The proportion of children in California growing up in households headed by a single parent is increasing, a trend that shows no sign of reversal (fig. 2). In 1998, 27% of California's children under 18 lived in single-family homes (US Census Bureau 1998). With the growing ethnic and racial diversity, there will also be increasing numbers of large families (see p. 11). The trends toward more single-parent and larger families forecast a future with more families living in or near poverty (Corcoran and Chaudry 1997). Each of these factors represents a risk in the lives of children and youth — risks for compromised health, educational performance and attainment, and ultimately for healthy and successful adult lives.

Compounding these risks, California parents are laboring more hours to keep pace with the state's rising cost of living (California Department of Finance 1998). For example, adults in California manufacturing occupations worked an average of 41.2 hours per week in 1995, and 41.9 hours only 2 years later; likewise, average overtime hours increased from 4.2 in 1994 to 5.1

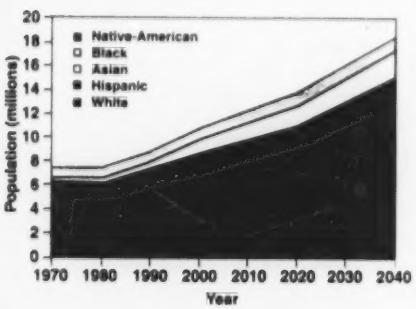

Fig. 1. Population of youth under age 20 in California, 1970–2040. Native-Americans made up 0.4% of the population in 1970 (32,000) and are projected to make up the same proportion in 2040 (71,000). Source: California Department of Finance, 1998.

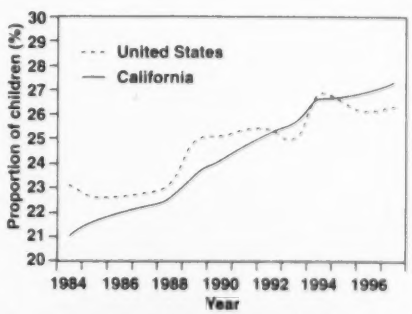

Fig. 2. Percentage of single-parent households with children in the U.S. and in California. Source: Annie E. Casey Foundation.

Suzanne Pasley

Jack Kelly Clark

***Top,* Programs like the 4-H After School Activities Program (ASAP) in West Oakland help to constructively fill the gap of time between school and home. In the Central Valley, a mother helps her son with his homework.**

in 1997. While it is good news for adults that the economy can support this surprisingly high number of hours, the bad news for youth is their parents have less time to spend with their families, increasing the potential for more children to grow up "at risk."

While the work lives of many adults have expanded and decreased their time at home and with family, the corollary for youth — school time — has remained relatively constant for several generations. As parents have less time for family, entertainment and religious or community involvement, youth spend an increasing proportion of their time away from both family and school. Single parenthood, women's work-force participation, and increasing work hours have changed family life, but public education has not changed as quickly in response. To be sure, many schools are responding to the before- and after-school needs of children, and a plethora of private programs are available. However, many such programs cost money, and with 29% of California children under 18 living in families with incomes at or below the poverty level ($16,450 for a family of four), access is often limited to those with the financial means (Children Now 1999). Institutions of formal education have been unable to fill in the increasing gap of time that parents are unavailable to directly care for and supervise their children.

As never before, California communities of the 21st century will face challenges providing for the youth population. At the same time, however, a hopeful shift is taking place in the way many communities approach youth issues. For the past 30 years, the United States has been a largely adolescent-negative society. When discussed at the community or policy level, attention to youth issues routinely implied problems: substance use and abuse, delinquency, sexual activity and early pregnancy. In recent years, these social attitudes have begun to change thanks to research on the developmental assets and resilience of youth (those who "beat the odds") (Braverman et al. 1994a). Notably, Werner, a professor in Human and Community Development at UC Davis, and her colleague Smith conducted some of the earliest and most influential work in this field (Werner and Smith 1992). This research has prompted communities and policy-makers to critically examine how the contexts of youths' lives can be improved to promote safe and healthy development.

Implications for California

Given the forecast for these changes in diversity, family life, and approaches to youth development in California, what are the implications for the lives of youth and their families, schools and communities during the first half of the 21st century?

Family life. Families will face challenges, not only in the practical aspects of family living, but in preparing the next generation for life in diverse communities. Parents who have less time with and for their children are stretched to provide safe, healthy opportunities for their children in nonschool, nonhome hours. Increasing numbers of parents will require options for safe, affordable child care and youth activities. At the same time, more families will be faced with the realities of living in multiracial and multiethnic communities. If the numbers of families living in racially and ethnically segregated (and often literally gated) communities continue to rise, the increasing inequality described by Taylor and Martin (see p. 26) may lead to a polarization between social classes in the degree to which they experience diversity. Nevertheless, whether or not social class insulates families of the future, we all will live in a state that is unavoidably diverse in terms of race, ethnicity and social class.

Public education. For schools, providing education to California's children in the next millennium will bring several institutional challenges. Children that come to school with less access to adults at home or in their familial, religious or social communities often bring unique problems to the classroom and teacher. For many of these youth, teachers play significant roles as caring adults in their lives. Already, teachers and schools are called upon to provide basic nurturing for children and youth; the degree to which they will be required to do this

Michael Macor/San Francisco Chronicle

Children from the Arbuckle Child Development Center play soccer in a San Jose park.

This 'third institution' would literally fill in the daily gap between school and home life, engaging youth in meaningful activities and opportunities for physical and emotional development, while preparing them for adult roles in a diverse society.

in the future will have a significant impact on the quality of public education. Beyond the issues brought on by growing numbers of children with special needs, the very definition of what constitutes appropriate public education for children living in a multicultural society will continue to be controversial. For example, does "appropriate" education for a diverse population include instruction in multiple languages? More generally, schools will be expected to provide education about diverse populations in ways that accurately portray multiple current and historical perspectives. Multicultural education in the next century will carry with it lasting implications for future generations of Californians.

Communities. The forecast for communities could be quite pessimistic. Existing levels of racial and ethnic tension among teenagers could lead to dramatic problems in the future. The demographic changes in the family that produce many more youth living in poverty or "at risk" could foreshadow an escalation in youth problems across the state. No doubt, the potential for these problems will challenge the recent positive changes in attitudes about youth. On the other hand, if communities continue to approach the issues of youth with a focus on community solutions rather than on youth and their problems, many of the potential difficulties can likely be avoided.

The University's role

Through expanded research and outreach, UC should play a major role by helping families, schools and communities understand these coming changes and develop effective ways to plan for them. In general, parents are best able to encourage youth to embrace the opportunities of a diverse society. But parents and other caring adults need resources to help them talk with their children about diversity, and they need to know the importance of having these conversations. Through the 4-H program, UC has long played a leading role in providing high-quality learning tools for use in informal settings (Junge et al. 1994; Braverman et al. 1994b). About 135,000 California youth and 18,000 adults participated in 4-H programs during 1999, while thousands more benefited from staff collaborations and research activities. Many of the tools developed by 4-H focus on complementing the learning that takes place in formal education (scientific, analytical and verbal skills). In the future, more attention should be placed on resources that foster learning about diversity.

As noted by Price and Cardullo (see p. 56) UC can and should lead efforts in local schools to prepare youngsters for the UC system. Indeed, each UC campus has active K–12 outreach for underrepresented populations. In addition to this fundamental work, a critical issue faced by practitioners is how to determine which youth interventions work. For instance, while all evidence indicates that school violence has been on the decline (U.S. Departments of Education and Justice 1998), the school shootings in recent years have raised public awareness about the need for programs to prevent such tragedies in the future. Schools need to know which violence prevention and intervention programs work, in which contexts, and why. Finally, there is an urgent need to determine the best methods of teaching tolerance and the values of multiculturalism and diversity.

UC must play a leading role in research and outreach that aims to develop civic engagement among groups that have not traditionally been the most active in governance. What are the effective models for educating youth and encouraging their involvement in civic life? These models undoubtedly vary across cultural and social class groups. What kinds of institutional changes need to take place to accommodate and encourage civic participation and ownership by diverse groups? How can engagement

Teen Pregnancy Coalition of San Mateo County

Members of the Teen Pregnancy Coalition of San Mateo County visit area middle and high schools to share the realities of teen parenting with students.

ANR responds to Hispanic teenage pregnancy

Elizabeth Gong ❑ Stephen T. Russell

The teen birthrate for Latinos is nearly four times the birth rate for white teens in California (California Department of Health 1995; fig. 1). In response to this alarming statistic, the Latina Teen Pregnancy Prevention Project was designed by 4-H youth-development advisors and collaborators in the San Francisco Bay Area to develop "best practices" for professionals who work to prevent teen pregnancy among Latino teens. The project critically examines recommendations by the National Council of La Raza (NCLR) for effective teenage pregnancy prevention and parenting programs to determine if they are relevant for efforts to prevent Latina pregnancy in the Bay Area. NCLR is the largest constituency-based, nonprofit organization in the country, encompassing 2 million Hispanics nationwide.

The nonadult Hispanic population in California is growing rapidly (see pages 11 and 48) Further, this population has the highest pregnancy rate, and thus is overrepresented among adolescent parents, while young Latina mothers have poor educational and employment profiles. It is important to identify effective pregnancy-prevention practices among this population to encourage Latino youth to postpone pregnancy until they are better prepared educationally, financially and emotionally to become parents.

This research compares strategies for working with adolescent Latinas gathered from the literature with reports from practitioners. Through audiotaped interviews, practitioners are asked if they agree or disagree with key recommendations in teen pregnancy prevention. Participants are given the opportunity to discuss their experiences and views on issues such as cultural sensitivity, comprehensive services, family and male involvement, education, work and gender roles.

Preliminary results of this ongoing study confirm that the "best practices" for teen-pregnancy prevention not only vary across cultural groups (Anglo and Latino), but among Latinos as well. These results will be shared with pregnancy-prevention practitioners through training and educational resource materials. By incorporating research-based, culturally

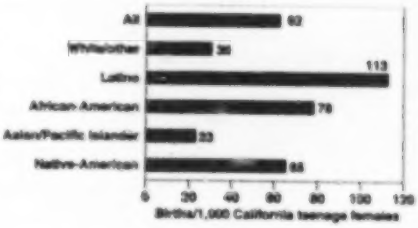

Fig. 1. Number of births to teenage females in California, 1996.

ANR Program Priorities/ Human Resources: Family and Individual Well-being

"Improve the status and well-being of families and youth living in high risk environments by reviewing and disseminating research in Human Development that leads to developing, modifying, testing and implementing educational programs and curricula that support families and youth such as developing parenting skills, building developmental assets in youth, and enhancing protective and resiliency factors in youth, families and communities (PPAC 1999)."

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specific "best practices" with ongoing field research, ANR can work to strengthen the capacity of schools and community agencies in their pregnancy-prevention efforts.

E. Gong is Project Coordinator, Teen Pregnancy Prevention Project and S. Russell is 4-H Youth Development Specialist, Department of Human and Community Development, UC Davis. For more information contact Santa Clara County Cooperative Extension, 408-299-2635.

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Program Recommendations, National Council of La Raza:

- Involve families, especially in cases where the teen mothers live with their families.
- Recognize and sensitively respond to cultural values regarding male-female roles.
- Have specific strategies for targeting young men, and have at least one male counselor.
- Conduct active outreach to involve the girl's partner or baby's father. Be prepared for resistance.
- Consider gender roles in relation to the importance of working. Some Latina teen mothers might not immediately see the importance of becoming self-sufficient.
- Emphasize education and support high aspirations since some Latinas may see becoming a mother as the end of their formal education. Encourage it in the context of providing a future for their children.

Suzanne Dudley

The Animal Ambassadors program, created by Veterinary Medicine Extension, is an example of how UC can better serve children by encouraging meaningful developmental activities.

be encouraged among groups that do not share a history or culture of participation?

Filling the gap

The two primary social institutions that exist in our society to provide caring and nurturing for youth — families and schools — have become less able to meet their full needs. It is simply no longer the case that a parent will be available to see a child off to school in the morning or be waiting when she returns home. Not surprisingly, the hours between the end of the school day and the time when parents return home from work are the ones during which many of the problems associated with teenagers are likely to occur (Belle 1999).

Current efforts to fill the gap between family and school time are broadly defined as "youth development." Before- and after-school programs, whether operated in private homes or churches, or through public agencies such as schools or 4-H, generally attempt to provide structured activities outside of the formal educational environment of the school system. Research has begun to demonstrate that these types of nonformal education are essential for healthy youth development (Walker 1998). Further, the adolescent problems that we hear so much about are best solved through youth-development approaches (Kirby 1999). Nonformal education encourages youth to be active participants in their education and develop their own solutions to problems they face; it can also provide the most meaningful exposures to diverse cultures, ideas and experiences.

Innovative organizations and programs serving youth around the state include the California 4-H Youth Development Program, California Conservation Corps, Scouts, YMCA and the Boys and Girls Clubs. There are also numerous programs in California communities that work to involve youth in sports, religion and mentor relationships. In the past, many of these programs actively engaged youth in civic and community life *with their families*. In other words, family participation was central to much of the youth development that took place a generation ago. But much of the youth development that takes place today is designed to fill in the gap between parents and school, rather than augment it. Further, most existing youth-development efforts do not specifically focus on diversity and multicultural understanding in their programmatic efforts.

The most radical solution to the widening gap between home and

school life would be the development of a new social institution. This "third institution" would literally fill in the daily gap between school and home life, engaging youth in meaningful activities and opportunities for physical and emotional development while preparing them for adult roles in a diverse society. This institution would develop innovative collaborations with employers and schools to involve families in regular civic and community activities with children. Youth and their families would be viewed as important resources for their communities, with the potential to make lasting contributions to civic goals.

The third institution could be conceived for the purpose of taking the lead in providing young people in California with the understanding and resources they will need to live as adults in multicultural communities. Such an institution could coordinate the multitude of activities that currently exist for youth. This coordination would serve to formalize the many examples of nonformal education that currently exist only in a patchwork fashion, providing opportunities for all children and youth to actively engage one another in their diverse communities. Rather than replacing existing organizations, such an institution would facilitate communication, coordination and replication of successful efforts.

Again, UC should play a leading role in such efforts, in collaboration with the existing array of youth-development organizations across the state and policy-makers. California is already the first state in the nation to have a legislative Assembly Select Committee on Adolescence. It would not be the role of UC to manage such an institution. The role of the land-grant university, and thus of the 4-H Youth Development Program, is to link research on youth and families to practical applications in communities across the state. California's 4-H Youth Development Program has provided national models for re-interpreting the 4-H program for the realities of contemporary life. Cross-aged teaching methods, new models for school-aged child care, and innovations in agricultural literacy are examples of some of the contributions California 4-H is making to youth development activities across the nation (Braverman et al.). Through research on effective programs and education, UC can provide leadership for guiding the third institution toward optimal education on diversity. This education could be carried out in collaboration with policy-makers and youth-development programs that span the state, including 4-H.

The notion of creating a new social structure on the level of public education may seem far-fetched. However, the idea that a society would provide education to every single child in the nation was also a radical notion when public education began in the United States. An opportunity currently exists to prepare youth for the diverse communities of the future.

California voters recently showed their commitment to children with the passage of Proposition 10, a tobacco tax earmarked to promote early childhood development. Perhaps they would also be willing to support a well-funded new institution which promotes research and the dissemination of information on youth welfare, and, more importantly, provides counseling and after-school programs for every young person in California who needs them. A collective effort to organize the unstructured time in young lives could provide a strong foundation through which to nurture children while educating them about how they will one day provide leadership for an integrated, diverse society.

Future in focus: Youth in the new millennium

California will see dramatic growth in the youth and racial/ethnic minority populations in the next 100 years. Accompanying these population shifts will be large-scale changes in family life, bringing with them imperatives for the increased availability of coordinated alternatives to formal education. California families, educators and policymakers must meet the challenges of a future defined by diversity through effective, coordinated youth-development experiences. Schools and families are already becoming more flexible as they manage the growing time young people spend between formal schooling and time with parents. This challenge will continue into the new millennium. A third institution would provide additional alternative activities, offering organized efforts for healthy growth and development within the context of multicultural communities.

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Elderly population will increase dramatically

Bryan Lincoln

In 1998, the oldest man in the world passed away in a San Rafael, California, nursing home: he was 115. Asked to what he attributed his long life, Christian Mortensen recommended drinking water, smoking one cigar a day, and lots of singing.

This astonishing person heralds some major increases in the size of the elderly population that will soon occur in California, across the nation and in most countries in the world. The post-World War II baby boomer's extremely large cohort "hump" is inexorably getting older and will fairly soon start reaching retirement age and beyond. This demographic movement, combined with falling mortality rates at older ages, will cause the number of elderly to rise dramatically into the middle of the 21st century, both in absolute numbers and as a percentage of the total population.

In addition to various sociological and lifestyle changes, this population tilt raises important questions about how government budgets and public services will respond.

Social Security. In absolute terms, California has the largest number of elderly of any state. At the same time, as a proportion of total population, California has one of the youngest populations among the states, largely due to considerable inflows of immigrants. In 1998, people over 65 made up 11.1% of California's population (45th in the nation), while those under 18 were 27.7% of the state's population (7th in the nation) (Statistical Abstract 1998).

The ratio of people aged 65 and older, compared with the working population between 18 and 64 — called the "old-age dependency ratio" — is of particular importance to Social Security. Roughly, it measures the proportion of a single retiree's benefits that are financed by a single younger worker. The total dependency ratio for California in 1999 was 0.175. The 1999 ratios for Hispanics (0.09), Asians (0.14), blacks (0.125) and whites (0.235) demonstrate the importance of immigration for the state's relatively "young" age structure. California's total dependency ratio is expected to grow to 0.32 in 2040, which means that approximately three workers will have to support one elderly person, versus about five workers today (California Department of Finance 1998).

Health care. Many observers consider health care to be an even more pressing problem than Social Security. Because of its high rate of cost growth, health care is expected to strain federal medical-insurance budgets (such as Medicare) much earlier than Social Security. In 1997, total national health-care expenditures were 13.5% of gross domestic product (the total income produced within the United States), the highest share for any country in the world.

This amount is split almost exactly in half between public and private funds (National Center for Health Statistics 1999). The rate of growth of medical expenditures slowed somewhat during the decade of the 1990s, from about 8% to 5%. But this short time-span of cost improvement, along with the extreme complexities of how the health-care market actually works, means health-care costs cannot be considered a problem even remotely close to being solved.

Trying to forecast the future budget of Social Security at current rates of taxes and benefits is somewhat easier than in the health-care sector. The Social Security Administration's official "best" forecast for when the Social Security trust fund will drop to zero is currently 2034 (SSA 1999).

Most experts agree that some type of adjustment must be made to the system. Already under current law, the retirement age will rise to 67 by 2022. One proposal would invest a percentage of the current trust fund surplus in the stock market; a more radical proposal would "privatize" the whole system, making it function more like a pension plan.

There is a consensus view though, that if policy options are limited to simply adjusting payroll taxes upward and lowering benefit schedules, the order of magnitude of changes needed to balance the Social Security budget is between 3% and 4%. This is relatively modest compared with the challenges faced by other industrialized countries. Though dealing with the coming wave of elderly will require significant adjustments, a view that the sky is falling is perhaps unwarranted.

Kelly Redinger/San Francisco Examiner

Christian Mortensen in 1997

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Students from California's agricultural regions tend to score poorly on standardized tests, limiting their eligibility for institutions of higher education such as UC and California State University. *Photos by Phil Schermeister.*

UC must take lead in curricula reform, teacher training

Mary V. Price ⅃ Richard A. Cardullo

California, once reputed to have the best public education system in the nation, finds itself ranked at or near the bottom at the end of the 20th century. Traditionally, the University of California has not been deeply involved in K-12 education, but the social and economic cost of an undereducated work-force in a global economy makes it imperative that all segments of California's system of higher education — including UC — get involved. The University can directly improve our public schools through outreach programs. At the same time, UC needs to improve its own curriculum, particularly in science and mathematics, and especially for prospective teachers. To prepare graduates for an increasingly technological world, curricula must be more interdisciplinary and inquiry-based, for science and for nonscience majors alike. By breaking down traditional barriers that have prevented UC faculty from participating in curriculum reform efforts, UC can play a leadership role in providing Californians the skills and knowledge necessary to succeed in the next century.

An appropriate role for an elite institution like UC would be to set the standard for California by producing the very best teachers.

As we enter the 21st century, UC and other components of California's system of higher education face a daunting task: to prepare a population that is changing rapidly in size, cultural background, academic preparation and geographic distribution for a world that is characterized by change and dominated as never before by science, information and technology. To provide Californians with the skills they, and the state, will need to succeed in the 21st century, it will not be enough simply to expand the capacity of California's universities to accommodate the approaching "Tidal Wave II" of high-school graduates seeking postsecondary education (see p. 10). There is growing consensus that universities must also overhaul their curricula, particularly in science and mathematics, and place greater emphasis on teacher preparation. In this article, we discuss the urgent need to improve kindergarten through 12th-grade education (K-12), how reform of university science curricula will help, and what obstacles to effective reform exist within UC. We focus on education in the science, mathematics, engineering and technology disciplines (SMET) because these fields and the skills they foster are pivotal to success in the modern world.

Science/math education: What's wrong?

Spurred on by Sputnik and the Cold War, our nation invested heavily in science education and basic research in the 1950s and 1960s. The investment paid off; it is estimated that 50% of the nation's recent economic growth can be attributed to this investment, which has allowed us to dominate emerging high-tech industries (Atkinson 1999). Beginning in the 1970s, however, the nation's commitment to education waned. By the 1980s, many federal educational programs that provided fellowships for graduate students or summer programs for high-school students had been terminated.

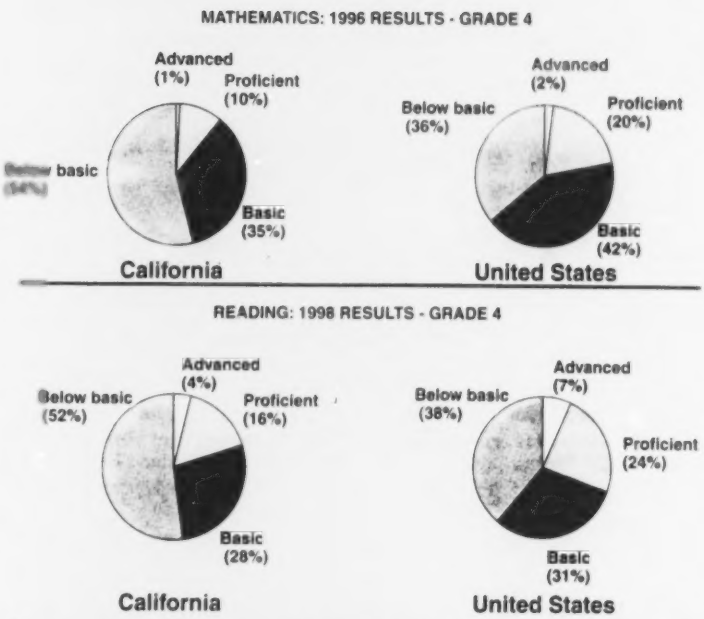

Fig. 1. Scores of National Assessment of Educational Progress, the "Nation's Report Card" for fourth-grade students in mathematics and reading, 1996 and 1998 respectively. "Basic" level is not the desired goal, but rather represents partial mastery that is a step toward proficiency. Source: National Center for Education Statistics.

This decline in commitment to education has short-changed our students. Standardized tests administered to U.S. students now indicate that our young people are ill-prepared to participate in the technological future. The National Assessment of Educational Progress, also known as the "Nation's Report Card," is a federally administered examination given to 4th-, 8th- and 11th-graders in the areas of mathematics, science, reading and writing. In 1992, only 7% of high-school juniors could demonstrate any ability in mathematics beyond basic algebra, while in science, only 10% of all juniors could "infer relationships and draw conclusions using detailed scientific knowledge."

The situation has not improved in recent years. Nationwide, in 1998 only 29% of 4th-grade students showed "competency over challenging subject matter" in reading, and in 1996 only 22% showed competency in mathematics (fig. 1). The performance of U.S. students does not compare well with other countries; internationally, the United States consistently scores at or below the median of participating industrial countries in both math and science (NCES 1999a). The general conclusion is that U.S. students do poorly on tests that require complex reasoning, inference, judgment and transfer of knowledge from one type of problem to another (Elmore 1996).

While the educational performance of students nationwide is poor, the situation in California is worse. California is first in the nation in number of K-12 students, but ranks near the bottom in such performance indicators as basic skills in mathematics, reading and writing; number of students per teacher; support staffing; expenditures per pupil; scores on the Scholastic Aptitude Tests; and percentage of high-school graduates going to college. In the most recent national assessments, California's 4th-graders scored well below the national average in reading and mathematics (fig. 1) with over half of all students failing to demonstrate "partial mastery of the knowledge and skills that are fundamental for proficient work." According to the National Center for Educational Statistics, only one state, Hawaii, was worse in reading in 1998 and only Mississippi was

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Steve Wallag/UC Riverside

The ALPHA Center is an organizing structure for a variety of outreach programs. UC Riverside AmeriCorps volunteers tutor Highland Elementary School students.

ALPHA Center: UC gets involved with K-12

The Academy of Learning through Partnerships for Higher Achievement (ALPHA Center) based at UC Riverside was established in 1999 to provide UC services and resources to public and private educational agencies including K-12 schools, community colleges, business and nonprofit organizations in the Riverside/San Bernardino area.

This unique program allows university faculty in science, mathematics and education to actively forge relationships with K-12 teachers and students. According to Executive Director Pamela Clute, in its first year the ALPHA Center worked with nearly 3,000 teachers and touched 44,000 students at 42 schools in San Bernardino and Riverside counties.

ALPHA Center's goals are to:

- Enhance the professional development and competency of in-service and prospective K-12 teachers through interaction with post-secondary instructors and faculty.
- Cooperate with K-12 programs to expose students to UC early enough that they are aware of higher education and resultant career opportunities.
- Increase the competitive UC-eligibility of local area students.
- Inform the evolution of sound educational policy by facilitating educational research on curriculum development.
- Catalyze involvement of UC Riverside and schools in the Riverside/San Bernardino area in the national educational community.
- Enhance the preparation of students entering UC Riverside and other institutions of higher learning.

For more information, go to www.alphacenter.ucr.edu.

worse in mathematics in 1996. Within California, performance varies widely but is uniformly low in agricultural areas such as the Central and Imperial valleys. Consequently, a smaller fraction of students from these regions is eligible for admission to California's elite institutions of higher education, such as UC and California State University (CSU) (fig. 2).

The assessments indicate that our students are deficient in knowledge and skills that are critical for their ability to obtain jobs that provide a living wage, to exercise fully their rights and responsibility as citizens, and to contribute to the economic competitiveness of California and the United States in the global marketplace.

What skills and knowledge are necessary for the 21st century? A growing proportion of today's jobs demand that people be able to learn, to think creatively and quantitatively, to reason, to communicate, to make decisions, to solve multifaceted problems and to work effectively in groups. Today's citizens must also be broadly knowledgeable about the natural and human world around them in order to make reasonable decisions in their personal lives and to engage intelligently in public discourse about important environmental, social and health-related issues facing society. Because science and technology are central to many of these important issues, and because many of the skills listed above figure prominently in the scientific endeavor, the poor performance of U.S. students in science and mathematics is of particular concern.

Poor student performance

Many factors constrain student achievement, including large class size, lack of access to educational materials, too little time devoted to reading and other literacy-building activities, poverty, poor nutrition, dysfunctional families, drug use, violence and teenage pregnancy (Hampel 1998). While the schools by themselves cannot solve sociological problems, there is clear evidence, in the form of programs that succeed against all odds, that they can be overcome to a significant degree by an effective educational system. Those exceptions to the rule point to two additional important factors in educational quality: curriculum and teacher preparation.

Curriculum. Nobody disputes the adage that "practice makes perfect." The knowledge and skills that are deemed important in the modern world can be acquired by students if the classroom provides them appropriate learning opportunities. The curriculum defines what those opportunities are. Traditional curricula fall short in a number of respects. They are organized along strict disciplinary lines and emphasize facts rather than concepts, individual rather than group effort, knowledge recall rather than knowledge synthesis and application to new problems. In addition, traditional curricula offer students little opportunity to discover knowledge for themselves by engaging in hands-on inquiry, even though there is ample

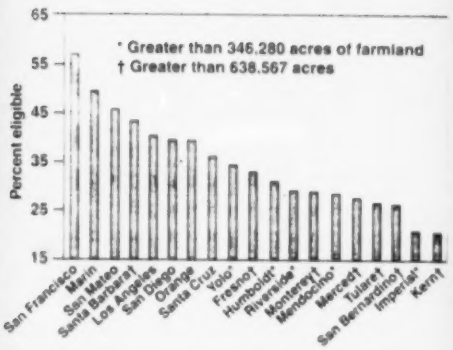

Fig. 2. Proportion of high-school graduates in California public schools meeting UC or CSU entrance requirements, by county, 1997–98. In general, counties with large agricultural areas produce fewer UC/CSU-eligible students than other counties. Sources: California Department of Education and U.S. Census Bureau.

John Slumbos

John Slumbos

Students in a Sacramento after-school program are improving science literacy through the Youth Experiences in Sciences (YES) curriculum, developed by the UCCE 4-H Youth Development Program.

evidence that personal experience is a powerful catalyst to learning.

As a first step in rectifying curricular problems, groups of university scholars and educators have been working together for decades to establish literacy goals and educational standards. Recent examples include the National Science Education Standards (NRC 1995) and the California Content Standards for Grades K-12 in Mathematics and Science (California State Board of Education 1999). A notable feature of these documents is that they include standards for skills — what students should be able to *do*, as well as for factual knowledge — what students should *know*. Curricula that teach to the new standards will emphasize quite different things from traditional curricula.

Teacher preparation. Another major contributor to poor student performance is inadequate teacher preparation. Educational research over the last two decades gives convincing evidence that the single most powerful factor in student achievement is the quality of the teacher (ACE 1999). Yet all too many teachers nationwide lack bachelor's or advanced degrees in the subjects they teach. In 1998, only 38% of full-time teachers majored in an academic field in college rather than in subject-area or general education, and almost 20% of teachers in grades 7 through 12 reported that they did not have a post-secondary major or minor in their primary teaching assignment (NCES 1999b).

Furthermore, the most talented college students tend not to become teachers. Students who become secondary-school teachers have academic records comparable to other undergraduates; however, students who become teachers of younger students generally have below-average records (ACE 1999). Consequently many teachers are unprepared to teach technical aspects of their disciplines, much less to lead students through inquiry-based curricula that demand of the instructor a deep understanding of how new knowledge in a subject is obtained as well as sophisticated pedagogical skills.

The publication in 1983 of "A Nation at Risk" (National Commission on Excellence in Education 1983) stimulated extensive discussion about how to reverse what the report called the "rising tide of mediocrity" in K-12 education. Now, after almost two decades of analysis, there is broad consensus about what needs to be done: (1) Develop effective curricula that deliver the new educational standards; (2) Disseminate curricular materials; (3) Attract the brightest and the best to be teachers; and (4) Train teachers well.

Curriculum development is well under way, thanks to grassroots efforts by an army of professionals interested in education and renewed investment by the National Science Foundation in science education. The next steps are more problematic because they require societal changes. The new curricula cannot be disseminated until local school districts adopt the new standards and make a commitment to implement them. The U.S. tradition of local control over education makes this large task all the more difficult. Attracting talented students

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to teaching careers will require a sea change in how our society views teachers. Few students who major in science and mathematics aspire to become teachers, and those who do become teachers often settle on teaching late in their undergraduate program when their academic performance precludes other, more lucrative, professions. The final step — improving teacher training — requires major change in the undergraduate programs of colleges and universities.

It is in these last two areas that universities, including research universities such as UC, can and should play a significant role in reforming K-12 education. An American Council on Education (1999) report on teacher preparation places the blame for inadequate teacher preparation squarely on the shoulders of the nation's colleges and universities and presents a 10-point action agenda for university presidents. The report calls the fact that half of the nation's schoolchildren are taught by unqualified math and science teachers a "reprehensible form of public-sanctioned malpractice."

What is UC's role?

A common misperception is that undergraduate education is a minor component of the mission of research universities such as UC. Under California's Master Plan for Higher Education, however, UC's educational role is clearly articulated: to provide the top 12.5% of high-school graduates — the next generation of leaders and problem-solvers — with the best-quality undergraduate education. Historically, UC has interpreted "best quality" to mean providing rigorous preparation for further training in graduate or professional schools, rather than training that qualifies students to practice a profession immediately after they graduate. Such vocational training is provided by other components of California's system of higher education. UC's undergraduate curriculum therefore emphasizes development of general cognitive skills, depth of knowledge in a field of inquiry, and intellectual and problem-solving skills for lifelong learning. Inquiry, in the form of undergraduate research supervised by research-active professors is, quite naturally, a significant component of the curriculum.

Although UC has eschewed vocational training for the most part, engineering and nursing are notable exceptions. Given the urgent need for improved teacher preparation, teaching may well become a third vocation deemed worthy of the UC system. Teacher preparation has historically been the mission of CSU, which currently produces 62% of California's teachers. UC, in contrast, produces only 4% of California's teachers and has specialized in teacher training primarily at the graduate level and in the postbaccalaureate credentialing process. Teacher training is compatible with UC's mission, however, if we view teacher preparation as equally important to that of students in other professions. An appropriate role for an elite institution like UC would be to set the standard for the state by producing the very best teachers.

There are signs that UC is prepared to accept more responsibility for K-12 education and teacher preparation (Atkinson 1998):

- UC President Richard Atkinson has committed to more than double the number of teachers produced annually by UC from 1,100 to 2,500, in the next few years.
- The Pathways initiative provides high-school advisors and students with Internet-accessible information about UC entrance requirements in order to improve access for groups currently underrepresented at UC.
- The UC Nexus program establishes a statewide partnership with K-12 schools, with the goal of facilitating greater use of new instructional technology, training and supporting teachers in the use of that technology, and developing improved curriculum that incorporates the new technology.
- The Master of Advanced Study initiative will expand University Extension to offer professional and liberal arts education beyond the bachelor's degree for working adults, a program of obvious potential for continuing education of in-service teachers.
- Finally, UC has inaugurated a new Principal Leadership Institute to train principals to lead inner-city schools.

Meritorious as these initiatives are, they do not address an important issue: the nature of the undergraduate curriculum for prospective teachers. High-quality teachers do not arise spontaneously; they are produced by programs that provide rigorous disciplinary and pedagogical training. To teach the new, inquiry-based K-12 content, teachers must be exposed to inquiry-based courses as well as the traditional courses on educational theory and practice. Here, one would think that an elite research university like UC would excel. Does it?

The need for curriculum reform

In fact, UC curricula suffer from many of the same problems that beset K-12 curricula, and there is no guarantee that graduating seniors achieve the literacy levels, particularly in science and mathematics, that are set for high-school graduates by the new standards (NSF 1996). UC therefore needs to reform its own curricula. Changes are necessary both in the "nonmajors" (general education) curriculum that provides all students with a broad understanding of the modern world, and in the "majors" curriculum that provides depth for students specializing in the SMET disciplines.

A four- to five-course "breadth" requirement is the only exposure to science and technology that nonscience majors obtain. (Conversely, SMET majors are required to take three English composition, four humanities and four social studies courses.) In California, this includes the vast majority of prospective K-12 teachers. The courses that these students can choose to fulfill the breadth requirements generally are developed independently by separate departments and are rarely integrated across departments. Hence, they are less likely to foster interdisciplinary perspectives. Furthermore, the student's major program, not the department offering the courses, determines which courses satisfy breadth requirements, so there is no guarantee that students will choose rigorous

courses that provide comprehensive exposure to any particular content. In addition, few of these courses include a laboratory. At UC Riverside, for example, only seven of 28 science courses intended primarily for nonmajors include a laboratory. This means that few students have the opportunity to learn what science is by engaging in inquiry. If UC graduates, including prospective teachers, are to obtain the skills needed for the 21st century, the nonmajors curriculum must be overhauled so that it fosters language and communication skills, quantitative reasoning, application of knowledge from diverse fields to complex problems, and a core of factual knowledge about science and technology essential in the modern world.

The curriculum for students specializing in the SMET disciplines needs similar reform. In recent years, the trend has been away from laboratory or fieldwork toward strictly lecture-based courses, even for advanced students. This must change. In addition, courses for majors need to become more interdisciplinary, more conceptual and more problem-oriented if we are to prepare students adequately for any career — teaching or otherwise — in the 21st century. Internship programs are needed to expose students to real-world problems, as well as new interdisciplinary majors in areas that provide students a perspective that crosses boundaries not only between physical and biological sciences, but also between humanities and social and natural sciences. Agriculture, conservation, environmental studies and human biology are examples of subjects that are intrinsically interdisciplinary. Finally, the difficult problem of remedial education for incoming students who are deficient in basic reading, writing and mathematics skills needs to be solved.

Obstacles to curriculum reform

Obstacles to implementing curriculum reform at UC include a faculty reward system that values scholarly achievement over teaching and service, and a compartmentalized structure for curriculum administration. At an elite research university like UC,

Phil Schermeister

UC committees are developing curriculum-reform proposals for undergraduate math and science education.

Recommendations for UC curriculum reform

In November 1997, the Nonmajors Curriculum Committee of UC Riverside's College of Natural and Agricultural Sciences proposed sweeping curriculum reforms.

General recommendations:

1. As a College, adopt science literacy as a primary goal of all of our curricula, including those designed for nonscience majors.

2. To achieve this primary goal, undertake revision of the nonmajors curriculum. Establish an administrative structure, such as an interdepartmental Nonmajors Curriculum Oversight Committee, whose mission is to draft formal goals for the nonmajors curriculum and to oversee development, implementation and delivery of a curriculum that meets those goals.

Specific recommendations:

3. Actively tap the full resources of UC, National Science Foundation and private foundations to support development of interdisciplinary, inquiry-based science courses for all UC Riverside students.

4. Use K-12 teacher preparation as a focus for curriculum reform; upgrade science and math components of UC Riverside's teacher preparation programs, both in quantity and quality.

5. Allow only those courses that satisfy an accepted set of curricular goals to fulfill General Education (GE) requirements. Develop new courses to fill gaps in the current course offerings.

6. Include at least one course with an inquiry-based laboratory in GE requirements.

7. Require quantitative skills at the Math 5 and Stat 20 level for graduation. Justify the requirement, and encourage useful course sequencing, by using those skills in all science classes.

8. Encourage a group of interested faculty to develop an experimental interdisciplinary curriculum that, if successful, could be expanded to serve all nonscience majors.

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Phil Schermeister

Nonscience majors will need core knowledge about science and technology to succeed in the modern world.

faculty "quality" is assessed primarily by published research output and success in attracting extramural grant funding. To be sure, teaching as well as professional, university and public service are also evaluated, but all faculty recognize that they will not be promoted on the basis of outstanding teaching or service if research is weak. This means that faculty cannot be expected to put in the time and effort required for curriculum reform unless they are released from other duties.

At UC, academic programs are the responsibility of the faculty. Most programs are administered, and faculty teaching is assigned, by departments that are organized along disciplinary lines. Most new courses originate with individual departments, and new administrative structures must be established *de novo* for interdisciplinary programs. Teacher preparation programs would optimally integrate efforts of faculty from science and liberal arts departments, as well from schools of education. Such cross-college programs are rare and take enormous effort to develop. It is unreasonable to think that they will happen solely through a grassroots effort by individual faculty.

Future in focus: Overcoming obstacles

These obstacles to reform of undergraduate curricula at UC can be overcome, but only if there is strong leadership from the administration and commitment of new resources to undergraduate education. Substantive resources are needed to provide sufficient laboratory space and staff support for inquiry-based curricula, and to provide incentives to faculty to participate in the cross-department or cross-college dialogue and effort needed to reform curricula and develop truly interdisciplinary programs.

There are encouraging signs that UC as an institution is accepting increased responsibility for the preparation of K-12 teachers. A Task Force Report on Faculty Rewards emphasized the importance of recognizing "the scholarship of integration, application and teaching" as well as "the scholarship of discovery" (UCOP 1991). UC President Atkinson has emphasized that teacher preparation and undergraduate education are important missions of UC and is actively encouraging campuses to take individual initiative in this area (Atkinson 1998; UCOP 1997). As a result, outreach programs such as the ALPHA Center at UC Riverside (see p. 58) and two new Principal Leadership Institutes are springing up, and faculty task forces on individual campuses are evaluating curricula and drawing up recommendations for change (see p. 61).

Despite these positive developments, enormous institutional inertia must be overcome for UC to achieve its potential in K-12 teacher preparation, and it is not clear that the resources needed to do so will be forthcoming. Will UC's response to the challenge of reforming undergraduate education be too little, too late for the incoming tide of young Californians?

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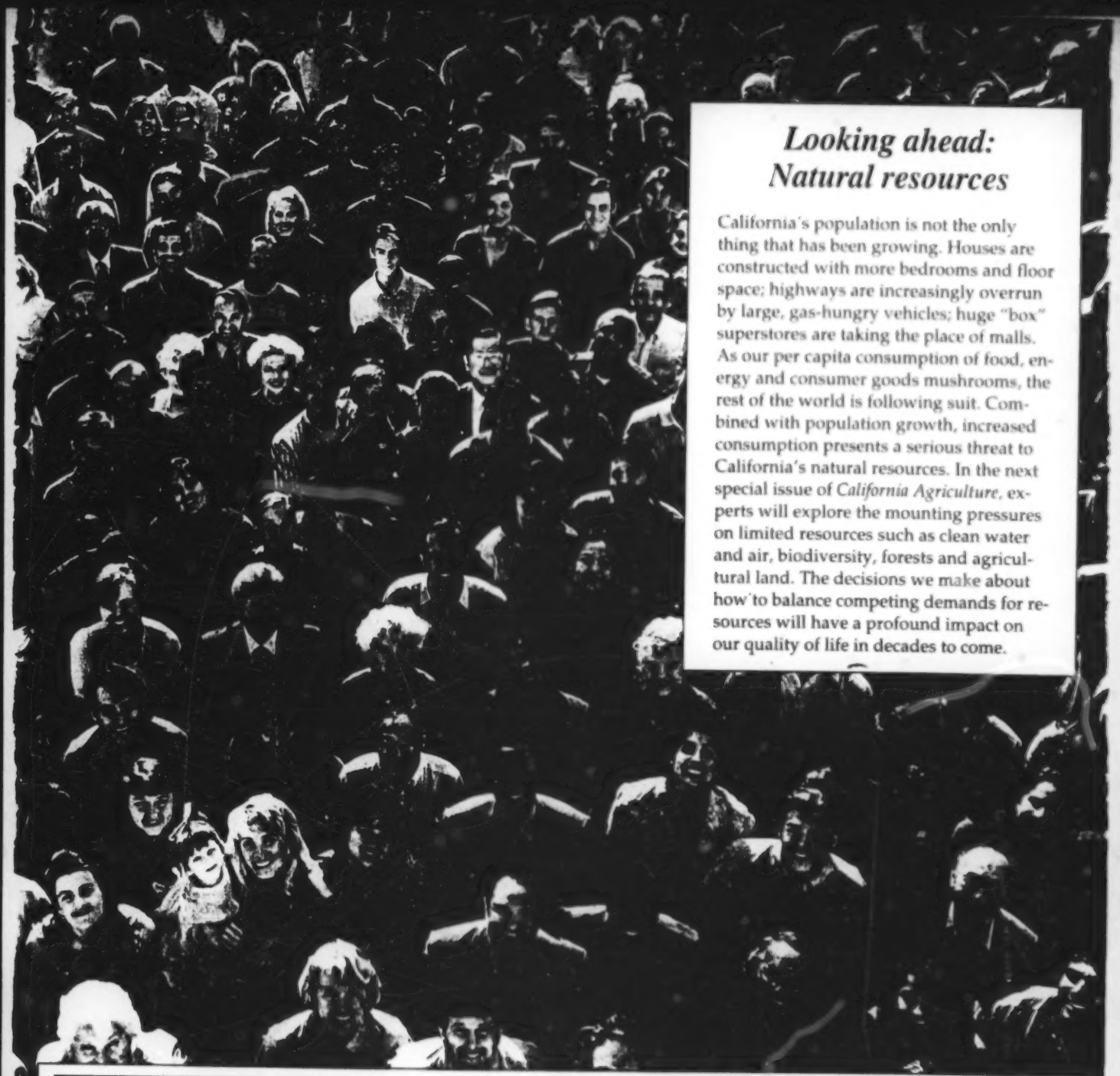

Looking ahead: Natural resources

California's population is not the only thing that has been growing. Houses are constructed with more bedrooms and floor space; highways are increasingly overrun by large, gas-hungry vehicles; huge "box" superstores are taking the place of malls. As our per capita consumption of food, energy and consumer goods mushrooms, the rest of the world is following suit. Combined with population growth, increased consumption presents a serious threat to California's natural resources. In the next special issue of *California Agriculture*, experts will explore the mounting pressures on limited resources such as clean water and air, biodiversity, forests and agricultural land. The decisions we make about how to balance competing demands for resources will have a profound impact on our quality of life in decades to come.

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